AUGUST 25 CENTS

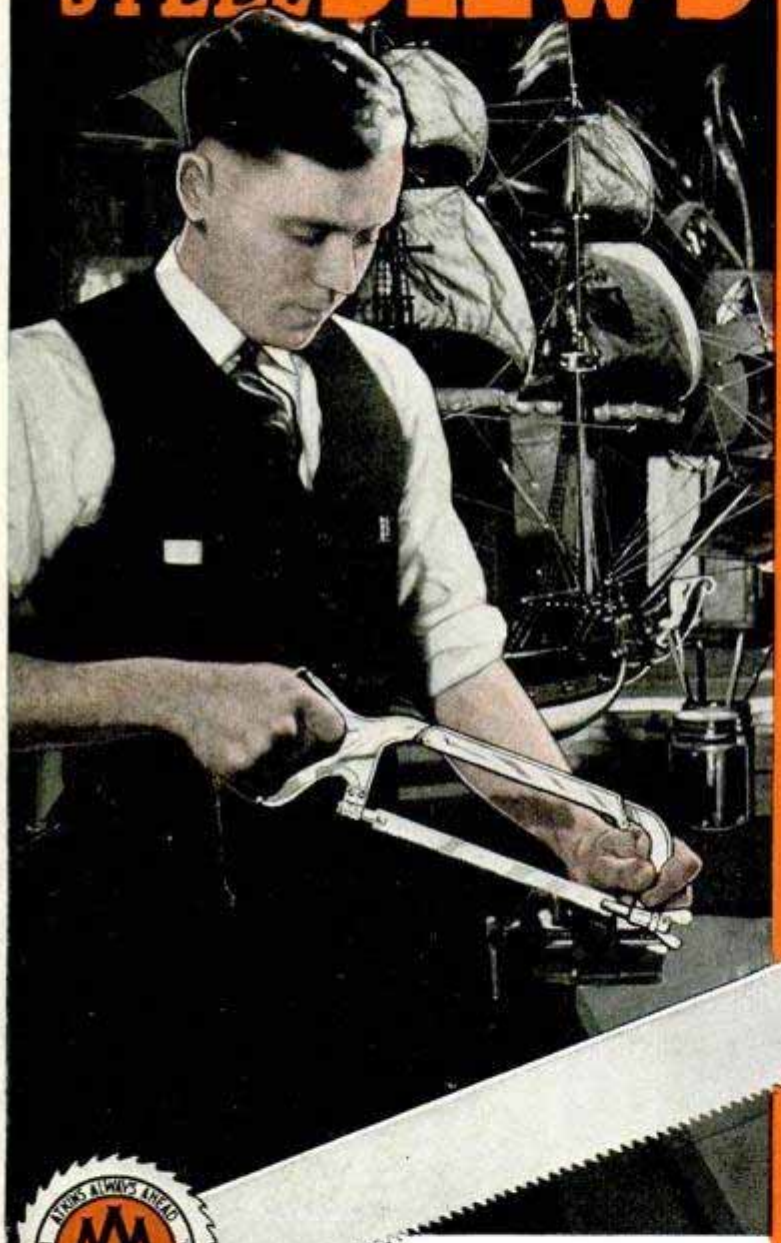
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REGD. TRADE MARK, GREAT BRITAIN, No. 410426

SEE PAGE 256

ATKINS SILVER STEEL SAWS



The New

ATKINS "Silver Steel" Hack Saw Blades

IN your home workshop—in every shop or on the job—in great industries—these wonderful new Atkins "SILVER STEEL" Hack Saw Blades have revolutionized metal cutting.

Developed and perfected in Atkins laboratories this "SILVER STEEL" blade, for hand or power use, has repeatedly proved in use that it cuts TWICE as fast and lasts SIX times as long as ordinary metal-cutting blades.

YOUR Hardware Store displays these "SILVER STEEL" Hack Saw Blades as shown above.

When you buy any saw, look for the Atkins name on the blade and save time, money and material. Atkins makes "A Perfect Saw For Every Purpose."

Saw Books FREE

It will pay you to write us and get these booklets. "Saws in the Shop" tells all about metal cutting. "Saws in the Home" has suggestions for articles you can make in your home workshop. "Saw Sense" tells about saws and their care. Sent **FREE**—write us for the one you want.

E. C. ATKINS & COMPANY
Established 1857
426 S. Illinois Street, Indianapolis, Ind.

Leading Manufacturers of Highest Grade Saws for Every Use; Saw Tools, Saw Specialties, Plastering Trowels, Machine Knives, Grinding Wheels and Files

Sold by first class Hardware Dealers the World Over

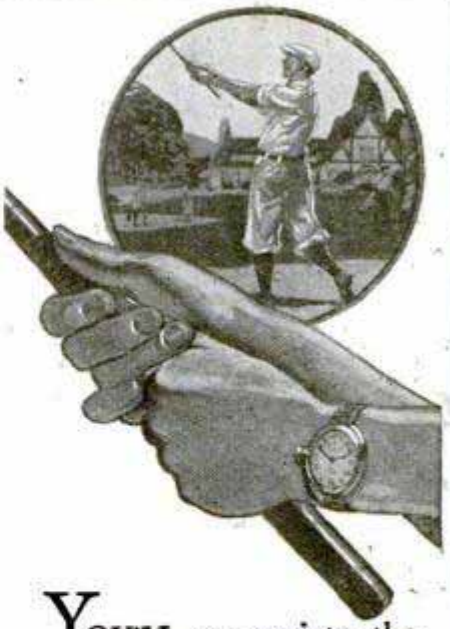
For Vacation

and all the time

The Ingersoll has become known as "*the* vacation watch." People who don't care to run the risk of injuring their expensive watches carry Ingersolls in the summer months. They find it the only way to have both dependable time and a care-free mind. For these reasons:

Ingersolls are built for sturdiness — as only Ingersoll knows how. They are factory tested to assure you time-keeping that is accurate as well as dependable. If an Ingersoll gets lost, it can be replaced almost anywhere, at any one of the hundred thousand stores that sell Ingersolls. And if it is broken, it can be sent to the Ingersoll Service Department at Waterbury, Conn., where it will be repaired quickly at only a nominal charge.

These are some of the features and advantages that make Ingersolls the most famous and popular watches in the world. Not just for vacation use, but for general wear all year 'round. Over eighty million people in the last thirty-six years have bought Ingersolls. Carry one and you'll know why.



A MAN'S watch with all the qualities that men want. Sturdy and dependable, accurate and good looking. It's handsome enough to carry *anywhere*—because it has the new antique bow and crown, thinner, closer casing, glass "crystal" and artistic dial. And strong, solid, simple construction gives it the ability to stand the gaff as an "extra" watch for vacation use.

Yankee

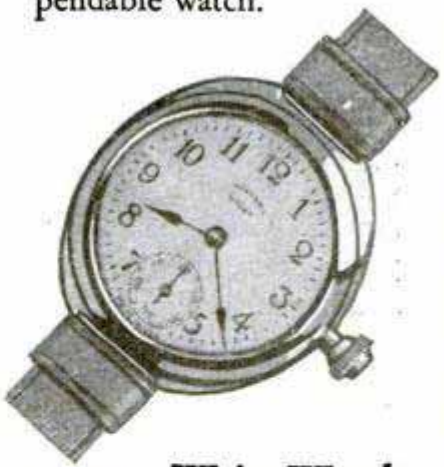
$1.50

***Radiolite*, $2.25**

YOU'LL appreciate the new chromium finish back of the Ingersoll Wrist Watch. Perspiration cannot cause it to corrode and mark the back of the wrist, as often happens with nickel-backed watches.

And the heavy, stitched leather strap—another new feature—will not curl.

Tonneau shape, mat finish metal dial and clear glass "crystal" enhance the appearance of this sturdy, dependable watch.



Wrist Watch

$3.50

***Radiolite*, $4.00**

Ingersoll

INGERSOLL WATCH COMPANY, Inc.

New York Chicago San Francisco Montreal *Service Dept.*, Waterbury, Conn.

Prices slightly higher in Canada

What is due the public

An Advertisement of the
American Telephone and Telegraph Company

THE Bell System recognizes the public requirement for a constantly extending and improving telephone service. Last year 4 million telephones were either put in or moved. The number of local calls not completed on the first attempt was reduced by 5 per cent. The average time for handling toll and long distance calls was reduced from 2 minutes to 1½ minutes.

During the last 5 years the Bell System spent $1,800,000,000 on additions, and improvements of its plant.

There is equally a public requirement for safety of principal and earnings of the stock of the American Telephone and Telegraph Company—the parent company of the Bell System. Since its incorporation in 1885 it has never missed paying a regular dividend to its stockholders, who now number more than 420,000.

The very nature of the telephone business necessitates a single interconnected system. The American Telephone and Telegraph Company accepts its responsibility for a nation-wide telephone service as a public trust. It is fundamental in the policy of the company that all earnings after regular dividends and a surplus for financial security be used to give more and better service to the public.

Popular Mechanics Magazine

200 E. Ontario Street, Chicago, U. S. A.

H. H. WINDSOR, Founder — H. H. WINDSOR, Jr., Editor and Publisher

London: Hachette & Cie., 16-17 King William Street, Charing Cross, W. C. 2

Paris: Hachette & Cie., 111 Rue Reaumur

Melbourne: Gordon & Gotch 509-513 Little Collins St.

ISSUED MONTHLY — SUBSCRIPTION: — SINGLE COPY, 25 CENTS

In United States and its possessions, also Canada, Cuba, and Mexico, per year, postpaid - $2.50
To all other countries in the Postal Union - - - - - - - - - - - 3.00
All subscriptions are discontinued at expiration. Please examine the date printed on your wrapper.

Entered as Second Class Matter Sept. 15, 1903, at the Post Office at Chicago, Illinois, under Act of March 3rd, 1879.
Entered as Second Class Matter at the Post Office Department, Canada.

Anaes ...blished monthly by POPULAR MECHANICS CO. Copyright, 1928, by Popular Mechanics Co. Copyright in Australia. Copyright in France

Vol. 50 — No. 2

Contents for August, 1928

Southern Cross

Special Features

Travel of the Future 194
The Unsung Heroes 202
Half Around the World in Sixteen Days 210
Muscle and How to Use It 219
On the Trail of the Swindler 242
Training Circus Horses 258
The Latest Mystery of the Heavens 266
Modern Wizards of Water Magic 274
Man's Law on the Yukon 291

Agriculture—women farm experts in Sumatra 193
Airplane—ninety-foot tri-motor for transatlantic flight 280
Amber—rich mine gives work for entire village 272
Amusement Park—coin-in-slot swinging seat 254
Anchors—mushroom, to hold landing fields at sea 279
Archæology
  man's antiquity evidenced by new finds 249
  probing the tomb of first artist of all history 230
Architecture—home in side of cliff for movie stars 239
Army Training—war game with model map 288
Astronomy—telescope with giant lens 264
Automobiles—glass hood permits view of motor 246
Automobiles—Accessories
  clasps for skid chains simplify adjustment 238
  clock like speedometer withstands shocks 236
  clock on gear lever replaces knob 215
  extension rim on wheel helps travel in mud 193
  glass protector keeps windshield clear 281
  handle on steering wheel is aid to driver 208
  jewels on license bolts increase safety 249
  light with magnet base 255
  mud clamps for tires prevent sticking 271
  posture pad promotes health 256
Automobiles—Driving—steering wheel turns lights 295
Automobiles—Equipment and Supplies—rubber bumpers guard car and passengers 209
Automobile—Tires—spring to hold valve cap 273
Automobile Truck—electric cooler helps motor shipping 223
Aviation
  air-rail passenger routes to speed traffic 254
  Britain's bid for the world's air capital 251
  improved neon arc light to aid 296
  international aero station 234
  plane rigged for blind flying to reduce night hazard 218
  seaplane to carry hundreds over ocean in few hours 290
  three hundred air schools show growth 250
Bed
  folding, fits in dresser drawer 288
  that gives comfort on hot nights 208
Bees—honeycomb fifty feet long found in house wall ... 265
Boats and Boating—big motor boat like torpedo for transatlantic trip 216
Books—made to "talk" to the blind 265
Bottle—glass tube in cork serves as funnel 214
Bridge—stone arches replaced by steel span 250
Cake—in form of skyscraper weighs half a ton 285
Calking—automatic gun leaves one hand free 206
Carpet Sweeper—with combs to keep brushes clean ... 294
Catnip—as lure for bobcats helps protect game 279
Chimney—felling giant, shows skill 289
Clock
  buzzes warning of engagements 284
  thermal motor winds, as temperature changes 200
Coal—gases from smoke may cause colds 256
Concrete—wire-carpet form improves cement floor 264
Corn—husks used to polish rubber 294
Crime
  portholes in windshield help in bandit chase 207
  two-wheeled forts aid police war on bandits 248
Currency—seek longer life for paper 281
Diving—queer suit to reach greater depths 224
Door—with bronze grille guards against burglars 255
Electric Lights—giant bulb for special purposes 273
Electric Signs—changeable, made up with loose lamps 290
Exercise—apparatus for neck promotes health 295
Explosives—tons shipped without loss of life 284
Fenders—for desk save silk hose 278
Fertilizer—apply with hose while watering lawn 200
Filling Station—umbrella-top has automatic gong 257
Fire Fighting—tests with chemicals help reduce losses 280
Fish and Fishing
  aquarium tests show fish answer call to food 248
  minnow net comes apart for easy packing 236
Floods—seven-ton concrete braces help curb 272
Fruit Squeezer—fits on table and saves time 254
Geysers—rain and snow feed 288
Giraffe—"skyscraper" cage needed to ship 241
Glaciers—tell their secrets in clockwork "diary" 256
Glass Eyes—require blowers' highest skill 224
Glass, Optical—big disk tested at night to reveal defects 232
Golf
  dummy as instructor shows proper form 240
  grip guides, for players help improve game 233
Hats—changeable styles, decoration for porch posts.. 279
Hedge—accordion cutter leaves smooth edges 207
Helium—new plant for military dirigibles 273

[Continued on Page 4]

[Contents—Continued]

Hosiery—how to tell fashioned from imitation 201
Hot-Water Bag—has electric heater 238
Household Devices 286
House Plan 352
Insurance—patent, protects inventor and maker 279
Ivy Poison—effective chemicals for 216
Kettle—gives whistle signal when food is cooked 254
Keys—case with swivel hook 284
Land, Reclaimed—yields big crops 247
Lawn—renovator to clean, reduces hand raking 272
Locomotive—burns gasoline and speeds switching 215
Lumber—shipped in packages to save waste and time. 264
Machine, Recording—for store helps tabulate sales 236
Milk—kept fresh by iceless cooler 224
Money—armored car observatory helps guard 241
Mop—self-wringing, solves carrying problem 200
Motorcycle
  three-wheel-brake sidecar promotes safer riding. 217
  three-wheeled travels rough ground 232
Moving Pictures
  apparatus for retouching film lessens eye strain .. 208
  exhibited on airplanes 255
  huge liner as studio affords realistic scenes 223
  strap holds camera for steady pictures 236
Neckties—electric press for helps preserve fabric 230
Ocean Depth—over seven miles shown by echo measures 250
Parachute—fin for jumpers aids safer descents 256
Phonograph—unit for making own records 285
Photography
  four-lensed aerial camera to speed mapping 209
  photograph made on steel with high explosive ... 240
Piano—child's playing guide simplifies instruction ... 217
Plants—cabbage and radish crossed 249
Plow—for flat-bottom ditch makes sloping sides 218
Purse—keeps coins sorted 284
Radio
  combination a.c. and d.c. test set 301
  handy program index 311
  reducing local interference 311
Radio—Aerial
  antenna protects building 306
  building a telescope antenna 310
Radio—Amplifier—an inexpensive push-pull 311
Radio—Applications
  as alarm to waken people 209
  low-frequency waves to help treat disease 230
  microphone aids teachers as well as pupils 218
  portable loud-speaker set aids foremen 250
Radio—Batteries
  charging from d.c. supply 300
  old auto generator as charger 307
Radio—Coil—has twin rotors 307
Radio—Installation—soldering lead to lead 309
Radio—Loud Speaker
  make this effective drum 297
  practical kink for cone 312
Radio—Pictorial 302
Radio—Receiver
  detector circuit without B-battery 310
  five ways to electrify your set 303
  good tuning devices important 300
  tables for electric sets 308
Radio—Reception—reducing power-line pick-ups 301
Radio—Repairs
  handy testing points 312
  test points from phone plugs 309
Radio—Rheostat—safety stop for screw-in 301
Rays, Ultraviolet—reveal tooth cavities 257
Razor
  "parking" space for blade prevents cut fingers 215
  safety, thick blades last indefinitely 254
Refrigeration—gas flame keeps fish shipments frozen.. 288
Rowing—practice with mirror helps train oarsmen 257
Rubber—chemical prevents oxidation of 278
Rugs—experts say life is fifteen years 257
Safety Devices and Measures—electric hand stop signal protects pedestrians 247
Sand—pictures "painted" inside bottles 232
Sculpture—sculptor works six years on war memorial. 296
Searchlight—effectively reproduces northern lights ... 201
Ships and Shipping
  passengers put in basket to board steamer 238
  rudder as high as a house guides big ship 226
  wireless-controlled battleship 283
Shoes—modern "seven-league boots" afford high speed 248
Silk—artificial from coal 215
Sisal—substitute for gasoline from 247
Skyscrapers—"air rights," built over railroad tracks .. 227
Spoon—on metal bottle cap aids in taking medicine .. 247
Stamps—coin-in-slot dispenser for post office 230
Steel—made without furnace in new electric process .. 233
Stereopticon—"spirit" picture projector to aid teachers 281
Submarine
  diving bell to aid in rescues 296
  greater safety through improved design 207
Swimming—skiff as life-saving unit affords sport 273
Table—extension set saves space in small rooms 217
Telephone—messages to ships, planes and train by dial system 289
Tides—highest on Atlantic coast 255
Tools
  shears and punch in one save use of drill 247
  square for cutting rafters aids roof builders 216
Tortoise—raised in desert to supply food 280
Trousers—without seams woven in hand loom 284
Typewriter—for the blind has six keys 285
Violin—with straight sides is easier to play 240
Washer—crown, to hide screws and nuts 256
Welding—electric, promises noiseless building age .. 217

AMATEUR MECHANICS

Airplane—for "Lindy Junior" 313
Automobiles—shock absorber for the trailer 320
Basement—lock for the trapdoor 327
Canoe—pipe frame on auto holds 332
Dogs—portable heated house 333
Gun—spring, from old umbrella 318
Hogs—scalding and hanging 319
Leather—to preserve old 333
Lock
  for sliding windows 333
  remote-control electric combination, for sliding door 328
Molding—improvised plane for making 332
Moths—trap for catching night 326
Paints and Painting
  cleaning brushes 334
  staining wicker furniture 319
Photograph Negatives—removing emulsion from old .. 320
Photography—use of pack films in cut-film magazine. 326
Porous Plaster—to remove from the skin 331
Refrigerator—more space in 331
Screen—making a Chinese 329
Sink—how to clean a stopped 326
Target—that saves air-rifle bullets 327
Tools—improvised strip cutter 334
Tricks—can you do it? 321
Tumbler—homemade holder 331
Vegetables—sprayer and drain for 328
Vermin—protection against 331
Watering—system for hedges and terraces 320
Weather Vane—three wise owls make novelty 334
Windows—to open high, swinging 319

SHOP NOTES

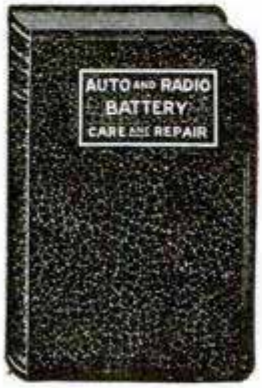
Automobiles—cementing gear-shift lever ball 349
Automobiles—Accessories—convenient location for tool box 346
Automobiles—Repairs—how to remove a broken spindle bolt 339
Barrels—truck for carrying heavy 349
Bearings—how to cool hot 340
Bees—jug trap for 350
Boxes—of varying height handled by adjustable tote-box truck 337
Cow—to prevent switching tail 350
Dividers—with bent points for marking centers 349
Doorplates—artistic, beautify home 335
Garage—build your own 341
Garage—Equipment and Supplies—seat for auto greasing attendant 339
Hogs—watering trough for 340
Hydrogen Sulphide—oil-seated valves for 338
Ink, India—how to use in fountain pen 347
Lathe—spring center for 350
Measuring Can—adjustable, for the shop 340
Milk-Cooler—spout shifts automatically 337
Paints and Painting—adjustable scaffold for painters. 347
Photography
  cure for slipping tripod 338
  washing prints in the kitchen sink 351
Poultry—wire basket helps turn eggs in incubator tray 347
Pump—locking clamp for pipe 346
Reamer—non-reversible holder 336
Rope—homemade machine for making 343
Steel Wool—for oilcan strainer 339
Stove—moving the kitchen range 339
Tools
  copperplating small 345
  device for lifting heavy work on bench 351
Tubes, Brass—forming small, bent 346

DRAKE'S PRACTICAL MECHANICAL BOOKS

THEY WILL RAISE YOUR PAY—

ORDER ON 5-DAY TRIAL

The books listed below will perfect you in your chosen trade—pave the way to the big positions. Written in non-technical language—easy to read and understand. **Every book covers its subject completely. An entire course of instruction condensed into one volume.** Your choice sent postpaid—you benefit 5 days— money refunded in full if not entirely satisfactory. Order direct from this page.

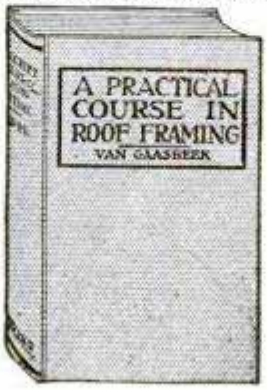


Automobile Books

tomobile Starting, Lighting and Ignition, by Manly...700 pp.	$3.00
okes' Automobile Handbook...	$2.00
rd Motor Car, Truck and Tractor, by Manly.....Cloth	$1.50
Auto and Radio Battery, Care and Repair, by Manly...Leatherette	$2.00
otorcycle Handbook, by Manly..	$1.50

lop Practice Books

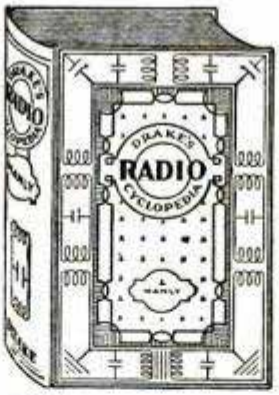
al Heating Systems, Trouble and Ventilation.....	$4.00
Metal Workers' Manual.....	$2.00
Acetylene Welding and Cut-.....Cloth	$1.25
Rule and Logarithmic Tables.	$2.00
ook for Millwrights...Cloth	$2.00
ne Shop Practice.....Cloth	$2.00
anical Drawing and Machine Design.....Cloth	$2.00



Carpentry Books

Cloth Binding

Modern Carpentry, 2 vols.....	$3.00
The Steel Square, 2 vols.....	$3.00
Modern Estimator.....	$1.50
Timber Framing.....	$2.00
Builders' Architectural Drawing...	$2.00
Concretes.....	$1.50
Practical Bungalows.....	$1.00
Roof Framing, by Van Gaasbeek..	$1.50



Drake's Radio Cyclopedia

By H. P. Manly

870 Pages, 985 Illustrations, 1700 Subjects, arranged alphabetically. For Service and Repair Men, Dealers, Salesmen, Experimenters and Designers. Bound in Art Buckram. Price.....$6.00

Painting and Decorating

Furniture, Furniture Finishing, Decoration and Patching.....	$5.00
Ross Crane Book of Home Furnishing and Decoration .....Cloth	$3.00
House Painting Methods with the Brush and Spray Gun, by Vanderwalker.....Cloth	$2.00
Interior Wall Decoration, by Vanderwalker.....Leatherette	$4.00
The Mixing of Colors and Paints, by Vanderwalker.....Cloth	$2.00
Studio Handbook—Letter and Design.....	$3.00
A Show at Sho' Cards.....Cloth	$4.00
Sign Painting, by Atkinson..Cloth	$4.00
Strong's Book of Designs, Leatherette	$4.00
Modern Painters' Cyclopedia.Cloth	$2.00
Automobile Painting.....Cloth	$1.50
New Hardwood Finishing....Cloth	$1.50
Wood Finishing, Plain and Decorative.....Cloth	$2.00
Owen's Paint Guide.....Cloth	$1.00

Steam Engineering

Swingle's Handbook for Steam Engineers and Electricians....Leatherette.	$4.00
Examination Questions and Answers for Marine and Stationary Engineers.....Leatherette	$2.00
Steam Boilers.....Leatherette	$2.00
Swingle's Catechism of Steam, Gas and Electrical Engineering..... .....Leatherette	$1.50

Modern Languages

By Prof. P. S. Allen, U. of Chicago

French without a Teacher....Cloth	$1.25
Spanish without a Teacher...Cloth	$1.25
German without a Teacher...Cloth	$1.25
Everyday French.....	$1.25
Everyday Spanish.....	$1.25

ORDER DIRECT FROM THIS PAGE —ON OUR MONEY-BACK PLAN

The books listed above are only a few of the many in our catalogue, which you will receive promptly after filling out and mailing us the attached coupon. For quick action order direct from this page—cross name of each book wanted and send in with price quoted. We prepay postage and send the books on our money-back plan.

FREDERICK J. DRAKE & CO.

Publishers

R508—179 No. Michigan Ave. CHICAGO

Drake Books Are For Sale at All Book Stores

Mail Coupon For Free Catalogue
Your Guide to Home Study

FREDERICK J. DRAKE & CO.
R508—179 No. Michigan Avenue
Chicago, Ill.

GENTLEMEN:—Please send me free, postage paid, your illustrated catalogue which lists and describes 200 Practical Mechanical Books for Home Study.

My name

and my a

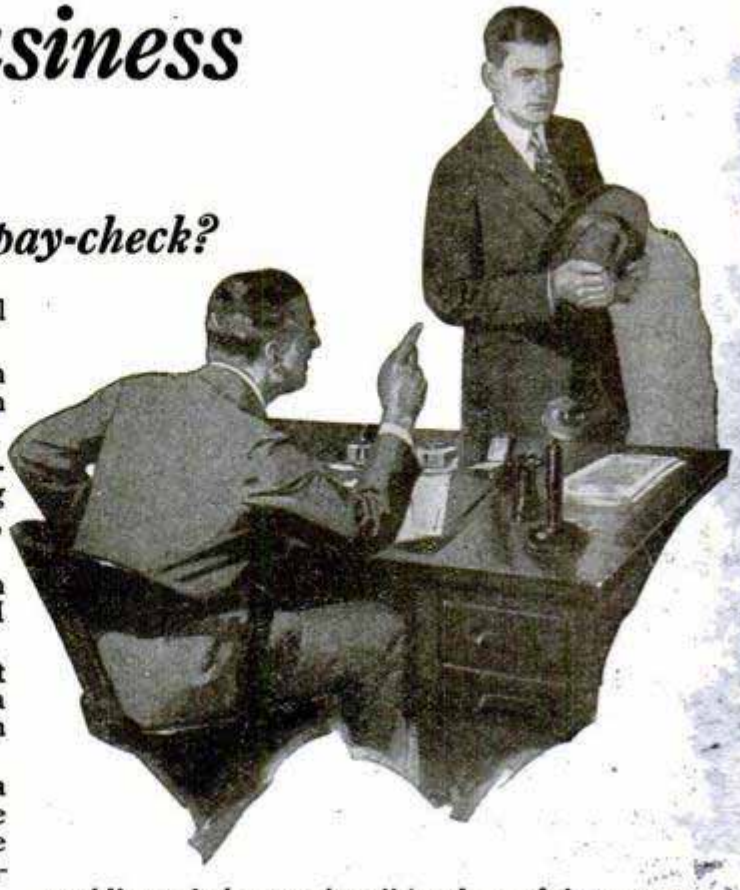
.....

This One

ZBAO-QBP-DG9C

Are YOU a Business Coward?

—and—does it show in your pay-check?



"You've *had* your chance!" It was the General Manager speaking . . .

"Two years ago I *warned* you that the only man who could hope to get ahead in this organization was the man with training.

"Merwin was only a bookkeeper then, you remember, but in his spare time he was studying Higher Accountancy. *I* knew what he was doing, and I told you then *to keep your eye on Merwin.*

"He's had three raises since. He has more than doubled his salary—and he earns every dollar I pay him.

"Last week I recommended him for Assistant Treasurer, and the Board elected him without a dissenting vote. We're mighty glad to have him in the group.

"But *you,* Jarvis—I hate to say it—you're a *business coward.* You *knew* what you would have to do to get out of the small-pay class. You were simply afraid to face the kind of effort and responsibility that could get you a substantial salary.

"And now it's too late. We've got to cut our overhead, and you're one of about fifty men that we can get along without. We could replace the lot of you tomorrow.

"For your own sake, Jarvis, take a tip from a man who has been through the mill, and *this* time get busy and learn to do something better than the other fellow.

"Jarvis, there's *no end* of opportunity in business; but the only man who cashes in these days is the man with the courage to get special training. The offices of this country are simply cluttered up with business cowards. It's easy for the man who *trains* —because the business coward is through before he starts."

* * *

Are YOU one of several million routine men who have been drifting along in a "low-pay" job—always *wishing* for more money, never *acting?*

Are YOU a business coward?

Over 640,000 ambitious men have asked themselves this question during the past nineteen years —and replied with a ringing "NO!"

In the quiet of their own homes, without losing an hour from work, these men have mastered the *principles* of business by working out the *actual problems* of business—under the direction of some of the ablest business men in their respective fields in America. Their record of achievement, under the "LaSalle Problem Method," is one of the most thrilling chapters in the romance of business.

These men were able to progress more rapidly by means of the "LaSalle Problem Method" than they could have done in any other way, because in their training they faced continually the very problems they must later face on the bigger job. *They learned by doing.*

Moreover, studying alone under the direct supervision of an expert instructor, they progressed as rapidly as their capacity allowed—and that progress was further speeded by the fact that every day they could see themselves developing. This fact took all the hardship out of study—changed it into a fascinating game, with always the goal ahead of increased opportunity and greater pay.

Whatever attitude you may have taken in the past, resolve today to face the problem of your business future *squarely.*

Within reach of your hand is a LaSalle coupon—and a pen. If the pen isn't handy, a pencil will do just as well. The coupon, checked and signed, will bring you without obligation a complete outline of the training you are interested in, together with full particulars of our *convenient payment plan* and also your free copy of the inspiring book, "Ten Years' Promotion in One."

It costs you nothing to get the facts—except the exercise of business courage. Will you put it off? *or put it over?* Mail the coupon NOW.

— — — — *Find Yourself Through LaSalle!* — — — —

LaSalle Extension University

The World's Largest Business Training Institution

Dept. 864-R **Chicago**

I would welcome an outline of the LaSalle plan, together with a copy of "Ten Years' Promotion in One," all without obligation.

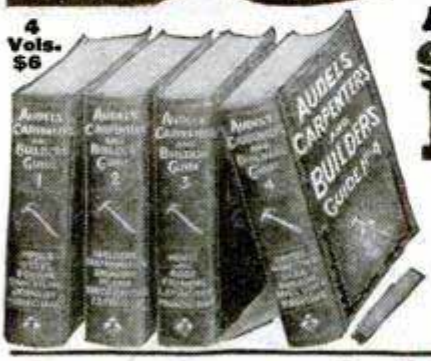
- ☐ Business Management
- ☐ Modern Salesmanship
- ☐ Higher Accountancy
- ☐ Traffic Management
- ☐ Railway Station Management
- ☐ Banking and Finance
- ☐ Modern Business Correspondence
- ☐ Business English
- ☐ Effective Speaking
- ☐ Telegraphy
- ☐ Law—Degree of LL.B.
- ☐ Commercial Law
- ☐ Credit and Collection Correspondence
- ☐ Industrial Management
- ☐ Modern Foremanship
- ☐ Personnel Management
- ☐ Expert Bookkeeping
- ☐ Commercial Spanish
- ☐ C. P. A. Coaching
- ☐ Stenotypy—Stenography

Name.....

Present Position.....

Address .....

BUILDERS TRADE GUIDES



AUDELS CARPENTERS AND BUILDERS GUIDES—4 VOLS. $6

$1 PER MO.

Inside Information for Carpenters, Builders, Joiners, Building Mechanics—all Woodworkers. **1600 pages; 3700 diagrams; flexible; pocket size.** Short-cut instructions, new methods, ideas, solutions, plans, systems—money saving suggestions. An easy progressive course for the apprentice. A practical daily helper and Quick Reference for the master worker. A Helping Hand to Easier and Better Work and Better Pay. To get this aid for yourself, simply fill in and mail the FREE COUPON below.

INSIDE TRADE INFORMATION ON:

How to use steel square; How to file and set saws; How to build furniture; How to use mitre box; How to use chalk line; How to use rules; How to make joints; Carpenters' arithmetic; Mensuration problems; Estimating strength of timbers; How to set girders and sills; How to frame houses and roofs; How to estimate costs; How to build houses, barns, garages, bungalows, etc.; How to read and draw plans; Drawing up specifications; How to excavate; How to use settings 12, 13 and 17 on the steel square; How to build hoists and scaffolds—skylights; How to build stairs; How to put on interior trim; How to hang doors; How to lath—lay floors; How to paint.

"Audels Guides worth four times their price—handy too as I carry them in pocket for reference." **W. J. Bates, Knoxville, Pa.**

AUDELS PLUMBERS AND STEAMFITTERS GUIDES—4 VOLS. $6

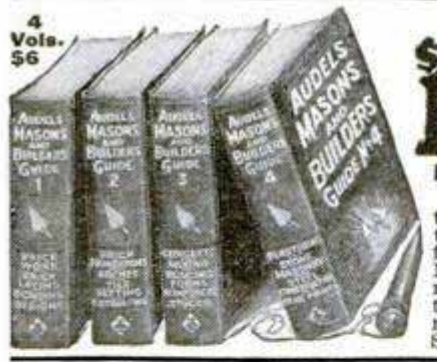
$1 PER MO.

A new set—just out! A practical, illustrated, Reference Library and Study-Course for Master Plumbers, Journeymen and Apprentice Steamfitters, Gas Fitters and Helpers, Sheet Metal Workers, Draughtsmen, Master Builders, Engineers and all Building Trade Students. **1670 pages; 3642 diagrams; flexible; pocket size.** Guides explain all the principles, advances and short cuts of the Plumbing and Heating trade. Contains instructions on how to figure and estimate jobs. Use FREE COUPON below to examine, without obligation, this valuable work.

INSIDE TRADE INFORMATION ON:

Soldering, tinning. Joint wiping, bending, beating. Pipe—iron—steel, threading. Mathematics, tables, physics. Materials—iron, steel, copper, brass, lead, tin, antimony. Sheet metal—galvanized—plate. Sanitation, syphonage, tanks. Drainage, sewage, purification. Fixtures—bath—kitchen. Pipe fittings, soil pipe, tools. Laying out work. Roughing. Screwed fittings, flanges, joints. Pipe bending, examples. Elbows. Heating, ventilation, refrigeration. Water supply, mains, wells, tanks. Gas-fittings. Underwriters. Sheet metal work, problems, methods, Brazing, heating, lead burning. Welding, various welds, methods. Blacksmithing, forges, tools.

"Audels Guides are practical, easy to understand, reliable. Cover the field in plain language." **W. F. Armiger, Annapolis, Md.**



AUDELS MASONS AND BUILDERS GUIDES—4 VOLS. $6

$1 PER MO.

A new, complete, illustrated trade reference library, for Bricklayers, Cement Workers, Plasterers, Tile Setters and Stone Masons, including a practical outline of Steel Construction. **1100 pages; 2067 diagrams; flexible; pocket size.** A practical Trade Assistant explaining modern methods of masonry construction. Easy to understand and apply. A reliable and authentic reference work and study-course for Master Journeyman and Young Mechanic. Use FREE COUPON below and find out for yourself, without obligation, whether this set will benefit you.

"Audels Masons Guides are the best books on the subject. Have laid brick 12 years and am able to judge." **H. A. Sennett, Corliss, Pa.**

INSIDE TRADE INFORMATION ON:

Bricklaying, tools, materials; Brick designs, patterns, bonds; Setting frames and foundations; Mortars, scaffolds, estimating; Mortars and mortar mixing; Tile setting, mosaic, hollow tile; Straight edge test, troweling; How to figure brick work; Safe loads, piers, chimneys; Boiler settings, anchors, fire stops; Labor tables; Concrete, forms; How to figure concrete work; Stucco—on old and new buildings; Plastering—wood lath—metal; Plasterers agreement; Plastering on various surfaces; Stonemasonry; Cutting, finishing, estimating stone; Derricks, rigging; Stee construction; Fire proof; How to read blue prints.

PRACTICAL ELECTRICITY — 1 VOL. $4

$1 PER MO.

Audels Handy Book of Practical Electricity is a simplified Ready Reference and Study Course in one pocket size, leather bound volume—for Engineers, Professional Electricians and Students. **1040 pages; 2600 diagrams; flexible red leather bound.** A reliable authority and handy helper for every electrical worker. Contains important and valuable wiring diagrams, calculations, machine sketches, helps on maintenance and repair. Use this FREE COUPON today and find out, without obligation, how this handy book will help you in your daily work.

Complete in one handy, red leather bound volume

INSIDE TRADE INFORMATION ON:

Electro-Therapeutics, X-Rays, Shocks, Welding, Brazing, **Radio** Hook-ups, Motion Pictures, Telephone, Telegraph, Cranes, Bells, Elevators, Pumps, Tools, Ship Drive, Railways, Vehicles, Automobile Electric Systems, Ignition, Generation, Lighting, Plant Management, Power Plans, **Armature Winding,** Repairing, A. C. Motors and Apparatus, D. C. Motors and Apparatus, Alternator Construction, Dynamos, Wiring Diagrams, Sign Flashers, Cable Splicing, **Power Wiring,** Outside Wiring, Switches, Lightning, Rectifiers, Converters, Transformers, Fuses, Circuit Breakers, Rheostats, Electro Plating, Electrolysis, **Storage Batteries,** Magnetism, Electrical Energy, Conductors, Insulators, Static, Dynamic, Radio Electricity, Applications, Ready Reference and Index Covering the entire field of Modern Electricity.

Learn More and You Will Earn More!

Know your job and you'll never be without one. The **skilled** man is always in demand. Knowledge is power. Learn your trade thoroughly by easy reading. This coupon is your opportunity for advancement and better pay. You risk nothing in sending for Audels Guides for *free examination.* Send it NOW!

FREE EXAMINATION COUPON

THEO. AUDEL & CO., 65 W. 23 ST., NEW YORK CITY

Please mail me for **free examination** the books marked (x) below. If I find them satisfactory, I agree to mail $1 in 7 days, on each set ordered, and to further mail $1 monthly on each set until I have paid the purchase price.

☐ **4 CARPENTERS GUIDES $6** | ☐ **4 PLUMBERS GUIDES $6**

☐ **4 MASONS GUIDES $6** | ☐ **1 ELECTRICIANS HANDY BOOK $4**

NAME .....

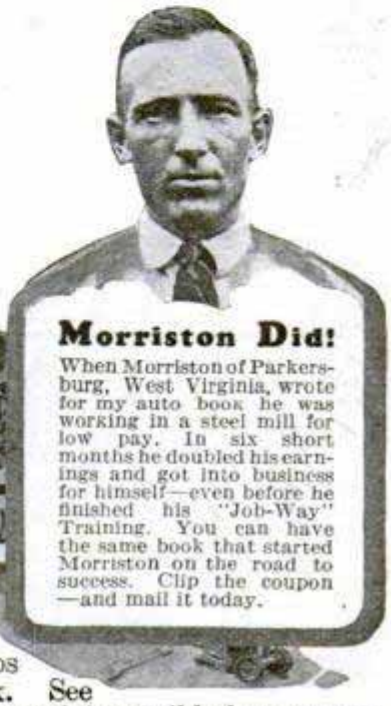
ADDRESS .....

OCCUPATION .....

EMPLOYED BY..... 8T30

Answer This Ad!

If You Want Quick Success and Big Pay In AUTOS



Morriston Did!

When Morriston of Parkersburg, West Virginia, wrote for my auto book he was working in a steel mill for low pay. In six short months he doubled his earnings and got into business for himself—even before he finished his "Job-Way" Training. You can have the same book that started Morriston on the road to success. Clip the coupon—and mail it today.

Earn Up to $100 a Week

Get YOUR share of the $5,000,000,000 spent every year on auto upkeep. **Just think of it**—more than 23,000,000 autos in the U. S. No wonder there are so many big pay jobs! Get into this fascinating game, now. Don't put it off another day. Get the facts. Mail coupon for big, FREE auto book. Learn of the countless opportunities in the World's Biggest Business where real jobs and big pay come quick. See how $50—$75—$100 a week is possible for you now. Learn how "Job-Way" Training has brought big money—promotion—shops of their own to scores of men. Find out about my Employment Department—how it helps you get a good job in the auto business.

Learn at Home in Spare Time

"Job-Way" Training is the short cut to Auto Success. No need to quit your present job—no need to leave home—just use your spare time to prepare for a brilliant future—a real job paying up to $100 a week. All you need is common schooling. I don't care if you've never touched an auto before, I can train you at home. You should be able to make extra money quick—a few weeks after starting. Men from all walks of life who worked long, hard hours for low pay are becoming garage owners, foremen and superintendents. If you like autos—if you're between 15 and 55—get the facts now. "Job-Way" Training covers everything about autos—Mechanical and Electrical Work, Starting, Lighting, Ignition, Welding, Vulcanizing, etc—Everything you need to get in line for a big money job as an Electrical and Mechanical Auto Expert. It's the trained man who gets the good jobs and "Job-Way" Training is COMPLETE, yet so simple, so easy that you get it quick.

Send Coupon for Free Auto Book

Do It NOW

Don't delay another day. Clip the coupon before you turn this page. Take the first step to a big-pay auto job. Now.

B. W. Cooke, Directing Engineer,
Chicago Motor Training Corporation,
Dept. C-116, 1916 Sunnyside Ave., Chicago.

Send me your free auto book. I want to succeed in the auto business. Tell me about "Job-Way" Training—about your Employment Department and your 4 testing and repair outfits offer. No obligation on my part whatever.

Name.....

Address.....

Town.....State.....

Age.....Occupation.....

Get my FREE Auto Book. Learn how "Job-Way" Training has brought success to hundreds. See what it can do for you. Find out how my Employment Department helps you get a good job—about the four testing and repair outfits you get. Read my money-back agreement and many other features.

B. W. Cooke, Directing Engineer

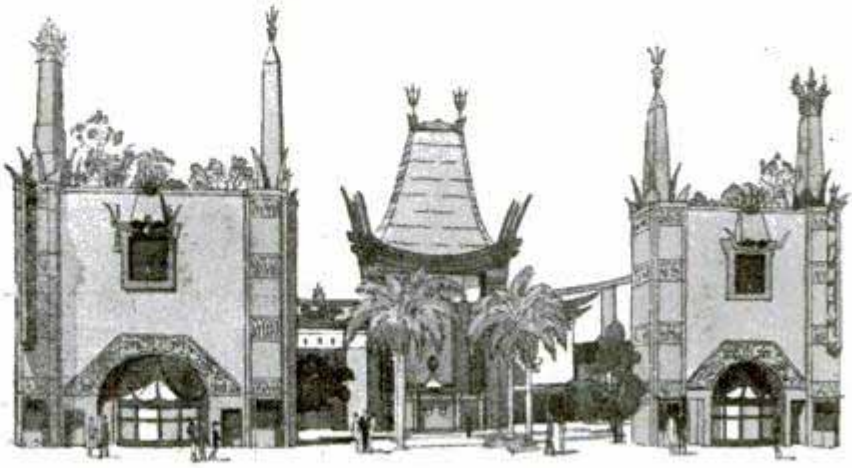
Chicago Motor Training Corporation

Dept. C-116, 1916 Sunnyside Ave. Chicago, Ill.

MILKMAN

MINER

BRONCHO BUSTER



And NOW the builder of a $2,500,000 theatre

Milkman! Miner! Broncho Buster! Orel R. Heinz had been all of these, but he was still a long way from the high-salaried class. So he decided to take up Civil Engineering.

Long before he finished his home-study course with the International Correspondence Schools he received dividends in the form of better jobs. Even before he secured his diploma, he was making $150 a month as draftsman.

What's he doing now? Well, he's a full-fledged Civil Engineer, and lately served as Superintendent of Construction of the $2,500,000 Chinese Theatre in Hollywood.

"Knowledge is of two kinds," says Mr. Heinz, "practical and technical. And right here is where the I. C. S. student has a great advantage. He gets his theory while he is engaged in practical work. I. C. S. training, in connection with practical experience, will put any man on top with the best of them."

Why don't you study, as Mr. Heinz did, and prepare yourself *to deserve* a better position and a larger salary? You can do it if you really try.

At least make the start by marking and mailing the coupon printed below and find out what the I. C. S. can do for you. It doesn't cost you a penny to ask for full details, but that one simple little act may change your entire life.

INTERNATIONAL CORRESPONDENCE SCHOOLS, Box 5548-F, Scranton, Penna.

"The Universal University"

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject *before* which I have marked X in the list below:

BUSINESS TRAINING COURSES

- ☐ Business Management
- ☐ Industrial Management
- ☐ Personnel Management
- ☐ Traffic Management
- ☐ Cost Accounting
- ☐ Accounting and C. P. A. Coaching
- ☐ Bookkeeping
- ☐ Secretarial Work
- ☐ Spanish ☐ French
- ☐ Salesmanship
- ☐ Advertising
- ☐ Business Correspondence
- ☐ Show Card and Sign Lettering
- ☐ Stenography and Typing
- ☐ Civil Service ☐ English
- ☐ Railway Mail Clerk
- ☐ Common School Subjects
- ☐ High School Subjects
- ☐ Illustrating ☐ Cartooning

TECHNICAL AND INDUSTRIAL COURSES

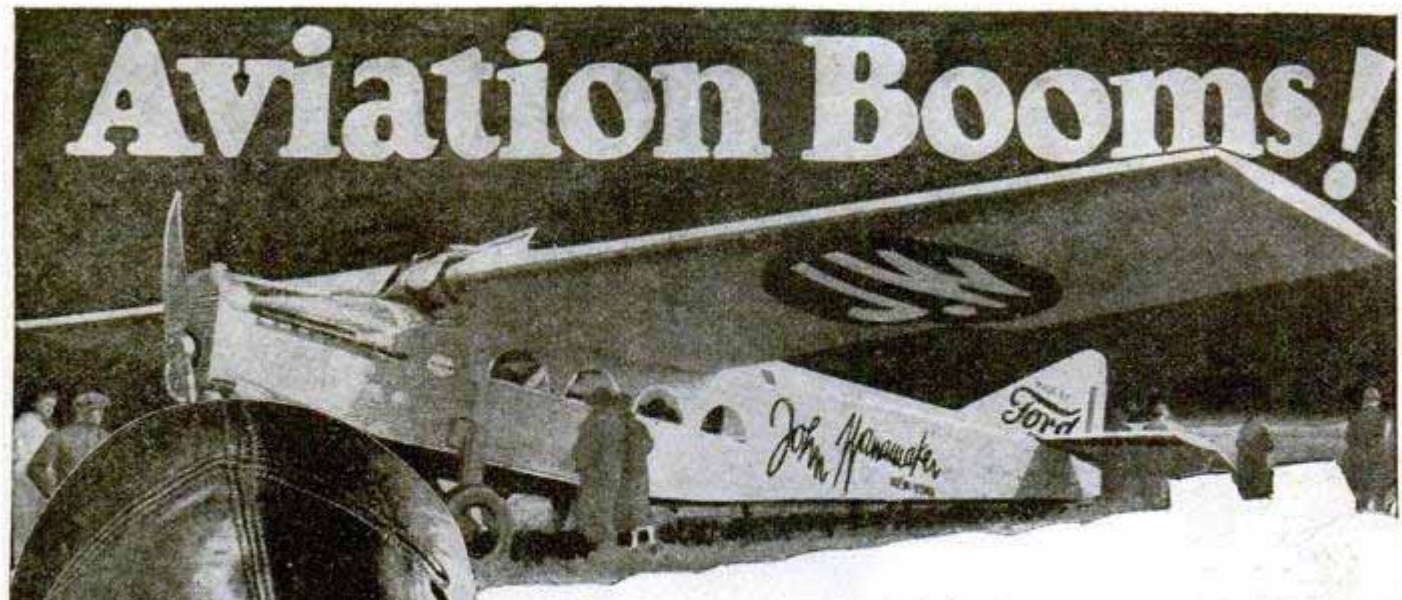
- ☐ Electrical Engineering
- ☐ Electric Lighting
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Railroad Positions
- ☐ Gas Engine Operating
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Mining
- ☐ Steam Engineering
- ☐ Architect
- ☐ Architects' Blueprints
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
- ☐ Concrete Builder
- ☐ Structural Engineer
- ☐ Plumbing and Heating
- ☐ Chemistry ☐ Pharmacy
- ☐ Automobile Work
- ☐ Airplane Engines
- ☐ Agriculture ☐ Navigation
- ☐ Mathematics
- ☐ Radio

Name..... Occupation.....

Street Address..... City..... State.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

Aviation Booms!



The skies are dotted with daring young men—from every country come stories of new feats—new victories—new heroes! And now Aviation, with all its Fascinating Adventure, calls for red-blooded young men—and will pay them splendid salaries! Read how some of Aviation's Pioneers will help you to qualify to get into Aviation—then send today for your copy of our FREE Illustrated Booklet, listing and describing the opportunities that await you.

If You Want Thrills-Popularity-Big Pay

LEARN AVIATION *QUICK!*

ARE you a red-blooded, daring he-man? Are you eager for a life of constant thrills, constant excitement and fascinating events? Do you crave adventure, popularity, admiration, and the applause of great crowds? Then why not get into the Aviation Industry—the greatest adventure since time began—the greatest thrill ever offered to man?

Think what Aviation offers you. Thrills such as you never had before! The praise and plaudits of the multitude. And a chance to get in on the ground floor where rewards may be unlimited!

Everything is set for one of the greatest booms in history. Big fortunes came out of the automobile industry and out of motion pictures. **Big** fortunes will also come out of Aviation! The development of Aviation as an industry is bringing with it a call for trained men. Those who qualify quickly should find themselves on the road to undreamed of money—success—popularity—and prominence!

full of interest—and so absorbing that you actually forget you are studying. But best of all are the ultimate rewards you are fitting yourself to gain!

PICK YOUR JOB!

Flying
Airplane Instructor
Airplane Engineer
Airplane Repairman
Airplane Assembler
Airplane Mechanician
Airplane Inspector
Airplane Builder
Airplane Salesman
Exhibition Manager
Airplane Contractor
Airplane Motor Expert
Airplane Designer

Send for FREE Book

Send the coupon for our new, free booklet, *Opportunities in the Airplane Industry.* It is vitally interesting, reads like a romance and tells you things about this astonishing profession you probably never even dreamed of. You owe it to yourself at least to read it. We offer you a free copy now, no obligation. Mail the coupon for yours today.

AMERICAN SCHOOL OF AVIATION
3601 Michigan Ave., Dept. 135-C, Chicago, Illinois

Easy to Get into Aviation by This Home Study Method

Get into this thrilling business at once while the field is new and uncrowded. Now—by a unique new plan—you can quickly secure the preliminary training necessary to get a start in the Aviation Industry, either flying or ground work, at home during your spare time. Experts will teach you the secrets—give you the inside facts that are essential to your success. And, the study of Aviation by our method is almost as fascinating as the actual work itself. Every lesson is chock-

American School of Aviation,
Dept. 135-C, 3601 Michigan Ave., Chicago, Ill.

Without obligation, please send me your FREE book *Opportunities in the Airplane Industry.* Also information about your Home Study Course in Practical Aviation.

Name.....Age.....

Address.....

City.....State.....

I Will Train You at Home to Fill a Big-Pay Radio Job

If you are earning a penny less than $50 a week, send for my book of information on the opportunities in Radio. It's FREE. Clip the coupon NOW. A flood of gold is pouring into this new business, creating hundreds of big pay jobs. Why go along at $25, $30 or $45 a week when the good jobs in Radio pay $50, $75 and up to $250 a week? My book "Rich Rewards in Radio" gives full information on these big jobs and explains how you can quickly learn Radio through my easy, practical home-study training.

Salaries of $50 to $250 a Week Not Unusual

Get into this live-wire profession of quick success. Radio needs trained men. The amazing growth of the Radio business has astounded the world. In a few short years three hundred thousand jobs have been created. And the biggest growth of Radio is still to come. That's why salaries of $50 to $250 a week are not unusual. Radio simply hasn't got nearly the number of thoroughly trained men it needs. Study Radio and after only a short time land yourself a REAL job with a REAL future.

You Can Learn Quickly and Easily in Spare Time

Hundreds of N. R. I. trained men are today making big money—holding down big jobs—in the Radio field. Men just like you—their only advantage is training. You, too, can learn Radio just as they did by our new practical methods. Our tested, clear training makes it easy for you to learn. You can stay home, hold your job, and learn quickly in your spare time. Lack of education or experience are no drawbacks. You can read and write. That's enough.

Many Earn $15, $20, $30 Weekly On the Side While Learning

My Radio course is the famous course "that pays for itself." I teach you to begin making money almost the day you enroll.

My new practical method makes this possible. I give you SIX BIG OUTFITS of Radio parts with my course. You are taught to build practically every type of receiving set known. M. E. Sullivan, 412 73rd Street, Brooklyn, N. Y., writes, "I made $720 while studying." Earle Cummings, 18 Webster Street, Haverhill, Mass.: "I made $375 in one month." G. W. Page, 1807 21st Ave., Nashville, Tenn.: "I picked up $935 in my spare time while studying."

Your Money Back If Not Satisfied

I'll give you just the training you need to get into the Radio business. My course fits you for all lines—manufacturing, selling, servicing sets, in business for yourself, operating on board ship or in a broadcasting station—and many others. I back up my training with a signed agreement to refund every penny of your money if, after completion you are not satisfied with the course I give you.

Act NOW—64-page Book is FREE

Send for this big book of Radio information. It won't cost you a penny. It has put hundreds of fellows on the road to bigger pay and success. Get it. Investigate. See what Radio has to offer you, and how my Employment Department helps you get into Radio after you graduate. Clip or tear out the coupon and mail it RIGHT NOW.

J. E. SMITH, President,
Dept. 8-H,
National Radio Institute
Washington, D. C.

RADIO NEEDS TRAINED MEN!

Here's the PROOF

Made $185 in 3 Weeks' Spare Time

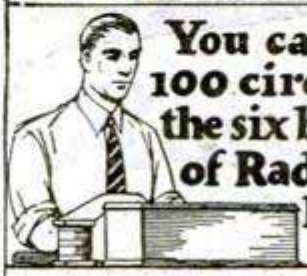
"I have met with continued success. For instance, recently I realized a profit of $185 in three weeks for spare time work. I charge $1.50 an hour. I have been making good money almost from the time I enrolled. The N. R. I. has put me on the solid road to success." Peter J. Dunn, 901 N. Monroe St., Baltimore, Md.

Made $588 in 1 Month

"The training I received from you has done me a world of good. Some time ago during one of our busy months I made $588. I am servicing all makes of Radio receiving sets. My boss is highly pleased with my work since I have been able to handle our entire output of sets here alone." Herbert Reese, 2215 South "E" Street, Elwood, Indiana.

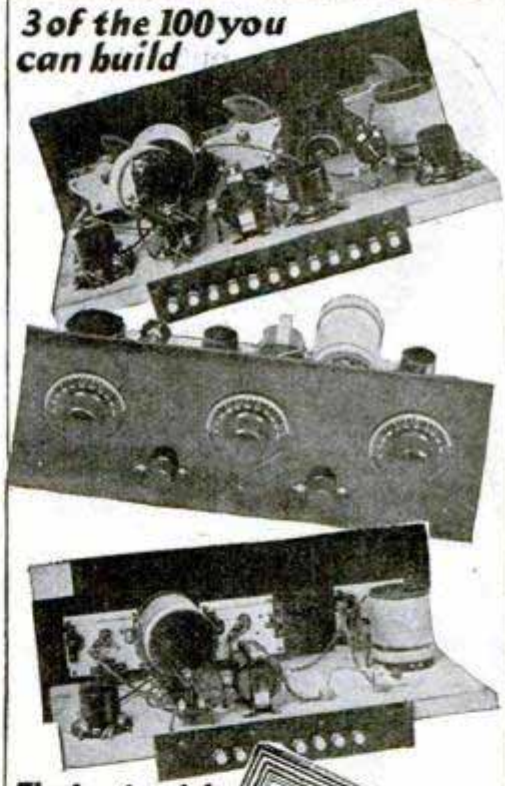
Earns Price of Course in One Week Spare Time

"I have been so busy with Radio work that I have not had time to study. The other week, in spare time, I earned enough to pay for my course. I have more work than I can do. Recently I made enough money in one month spare time to pay for a $375 beautiful console all-electric Radio. When I enrolled I did not know the difference between a rheostat and a coil. Now I am making all kinds of money." Earle Cummings, 18 Webster Street, Haverhill, Mass.



You can build 100 circuits with the six big outfits of Radio parts I give you

3 of the 100 you can build



Find out quick about this practical way to big pay

Mail This FREE COUPON Today

J. E. Smith, President,
Dept. 8-H, National Radio Institute,
Washington, D. C.

Dear Mr. Smith: Kindly send me your big book "Rich Rewards in Radio," giving information on the big-money opportunities in Radio and your practical method of teaching with six big Outfits. I understand this book is free, and that this places me under no obligation whatever.

Name..... Age.....

Address.....

City..... State.....

Occupation.....

Employment Service to all Graduates

Originators of Radio Home Study Training

You can make the BIG Money

in Auto Painting

—Because here is the biggest uncrowded field in the world today. Prove it to yourself by the next 20 cars you see. Yes Sir, 17 out of 20 need painting.

G. KING FRANKLIN
Famous Auto Painting Authority

I will have you ready in a few months

NOW—how many auto painters do you know? . . . I thought so. Well, who's going to do the work? **You** are—after you get the right training and you're going to make **more** money than you ever dreamed of! The world is looking for trained auto painters. Cash in on this big demand!

You Can Own Your Own Business!

In auto painting it's no trick to be your own boss—own your own business and be independent!

You don't have to start out with the biggest building on the busiest corner. You can begin small with little or no capital, **but I don't know of another business where you can get big so fast.**

You Can Make from $60 to $125 a Week

After you get my training you can get a job anywhere. You can travel and know at your destination there will be a job waiting for you that pays big money. Remember—I don't forget you when you complete the course. I help you get a real job. You also get a life consultation service without extra charge.

17,000,000 Cars Need Painting

Just imagine! There are t-w-e-n-t-y m-i-l-l-i-o-n cars in the U. S. alone—and 17 million need priming, surfacing, painting, ducoing, varnishing, striping and the whole works—and take it from me, I **teach** you the whole works so you can get in on the **Big Money**—or I'll refund every penny of the small price you pay.

I realize that you are up against quite a problem in deciding what field to enter, but on my say-so, and my guarantee to you, just come into auto painting with me and you'll be glad of it all your life. Men like yourself who have taken my advice are now making $5,000 to $10,000 a year.

TESTIMONIALS

Chicago Duco says: "Skilled Duco men are scarce. We can place many at $1.00 to $1.25 an hour." Binks, one of the largest auto equipment manufacturers says "The big auto manufacturers are insisting that their dealers repaint all used cars." Stockton, Illinois says "No shop here. All work must go to Freeport. Believe plenty of work to make paying business." Nash says: "This is a big field and splendid opportunities for your graduates in repainting cars." Many, many more like these.

MAIL the COUPON

G. King Franklin, Supt.,
American Auto Painting School,
Dept. 1701, 425 S. Ashland Ave., Chicago,

Send sample shop tickets free and information on how I may learn auto painting and Duco at home in spare time

Name.....

Street No.....

City.....

State.....

LEARN at HOME!

And the beauty of my proposition is that you can learn at home—in your spare time—in the evenings—and keep your present job while learning.

A few pennies a day puts you in line for a job in this big uncrowded industry. It doesn't obligate you or cost you a penny, to clip the coupon.

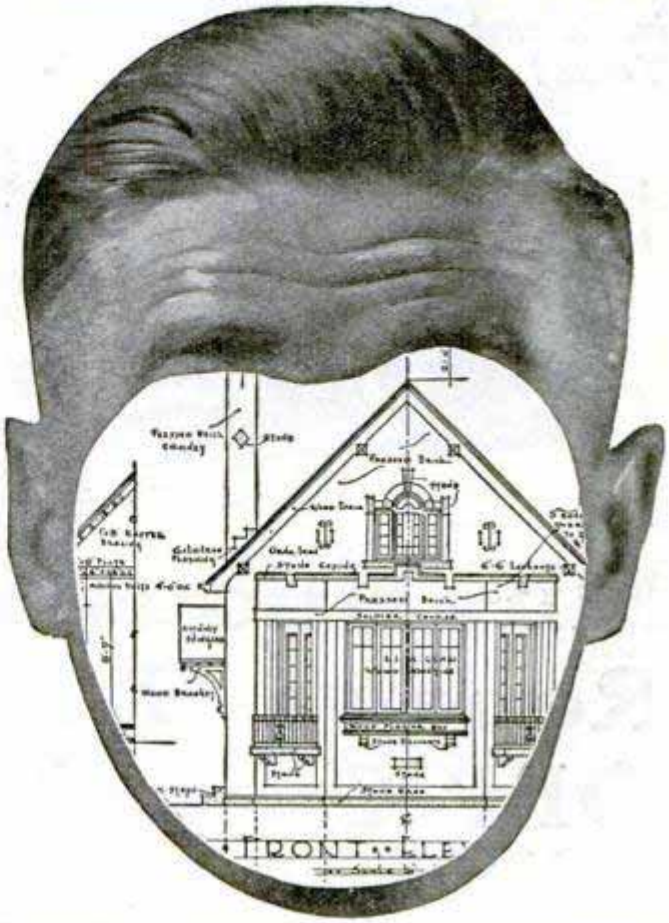
So get this information now—while Byrd and Chamberlin were talking about flying the Atlantic, Lindbergh **did it.** Nuff said! Act now!

G. KING FRANKLIN, Supt.
American Auto Painting School
Dept. 1701, 425 South Ashland Avenue, CHICAGO

A FRANTIC CALL FOR MEN WHO CAN READ BLUE PRINTS OF BUILDINGS

Leads Quickly to Jobs Paying $4,000 to $12,000 a Year

See how easy it is to get in the building game. Nowhere else does such simple training count for so much. Nowhere else can a man make $4,000 to $12,000 a year so quickly and so easily. Nowhere else are there so many countless thousands of openings as there are with contractors, builders, and real estate firms, who are constantly calling for men who can read blue prints. Six billion dollars a year is spent for building. Trained men are at a premium in this gigantic industry. Untold thousands are needed at steady salaries far above the scale wage.



90 DAYS EASY TRAINING PUTS YOU IN THE 6 BILLION DOLLAR BUILDING FIELD

NO longer is it necessary to start at the bottom of the building trades and spend years to work up. Now you can get three years' training in three months. There are no barriers to your success in the great outdoor building field. You do not need more than a common school education. We train you at home, in spare time, by the fascinating blue-print method with lessons that are as easy to read as your newspaper.

These tested plans come to you from one of the oldest and largest schools of building construction and superintendence in the country. This course is endorsed by leading contractors and master builders. These tested, practical plans and lessons are the kind of training that puts men in $4,000 to $12,000 jobs and in profitable building and contracting businesses of their own. You learn from actual blue print plans—from practical building experts—you learn how to read all the plans, estimate the costs and supervise the entire construction of a building—you learn everything a contractor has to know when he undertakes the construction of a building.

Amazing opportunities are open to you when you know blue prints, plans, estimating and construction. There is building superintending—the best outdoor profession on earth—that pays handsome salaries and often a bonus for efficient work. Clifford Scholl went from clerk to Asst. Superintendent at 49% increase in salary in 8 months. Thousands of builders and contractors need men like Clifford Scholl.

IF YOU LIVE IN OR NEAR CHICAGO

Visit our School for Builders, open day or evening. Thousand men attend each year. Enter any time. You can get the same training at home, by mail. Same plans; same lessons; same instructors. The Coupon brings all facts FREE.

Every Job Must Have a Contractor

The building field is wide open for men who want to go into business for themselves. Henry Mehl, Pa., a policeman, now owns his own contracting business. Burgert, Ill., stepped into a foremanship at 200% increase in salary. Busch, Kan., writes, "I have been offered $300 a month several times." Boyes, Can., writes, "Your school has increased my wages 40% already." Patrick, Mich., says: "My salary has been increased 92%." Marchand, La., writes, "I am getting along fine. My salary is now increased 196%."

Chicago Technical SCHOOL for BUILDERS

Dept. K-141, 118 E. 26th Street, Chicago, Ill.

If you really want more money—if you hope to own a business of your own—get into the building business . . . no matter what your job is now. No overcrowding in this tremendous field—room for thousands every day. Why buck competition in crowded industries where only a few men can succeed?
Clerk or carpenter—office man or bricklayer—salesman or superintendent—it makes no difference. You can get into the building business quickly . . . easily. Or if you are in it at present, get this training now, that you must have for success.

FREE Trial Lesson

Simply mail the coupon below for an intensely interesting free book "How to Read Blue Prints," and full information. See what fascinating fun this first trial lesson is. Get these facts before you. See what amazing opportunities open up for you in the Six Billion Dollar Building Field. Don't wait or delay. Act now. Simply mail the coupon below.

Chicago Technical School for Builders,
Dept. K-141, 118 E. 26th Street, Chicago, Ill.

Send me, without obligation, your free book, "How to Read Blue Prints" and full details of the course and the opportunities in the Building Field. It is understood that no salesman will call on me.

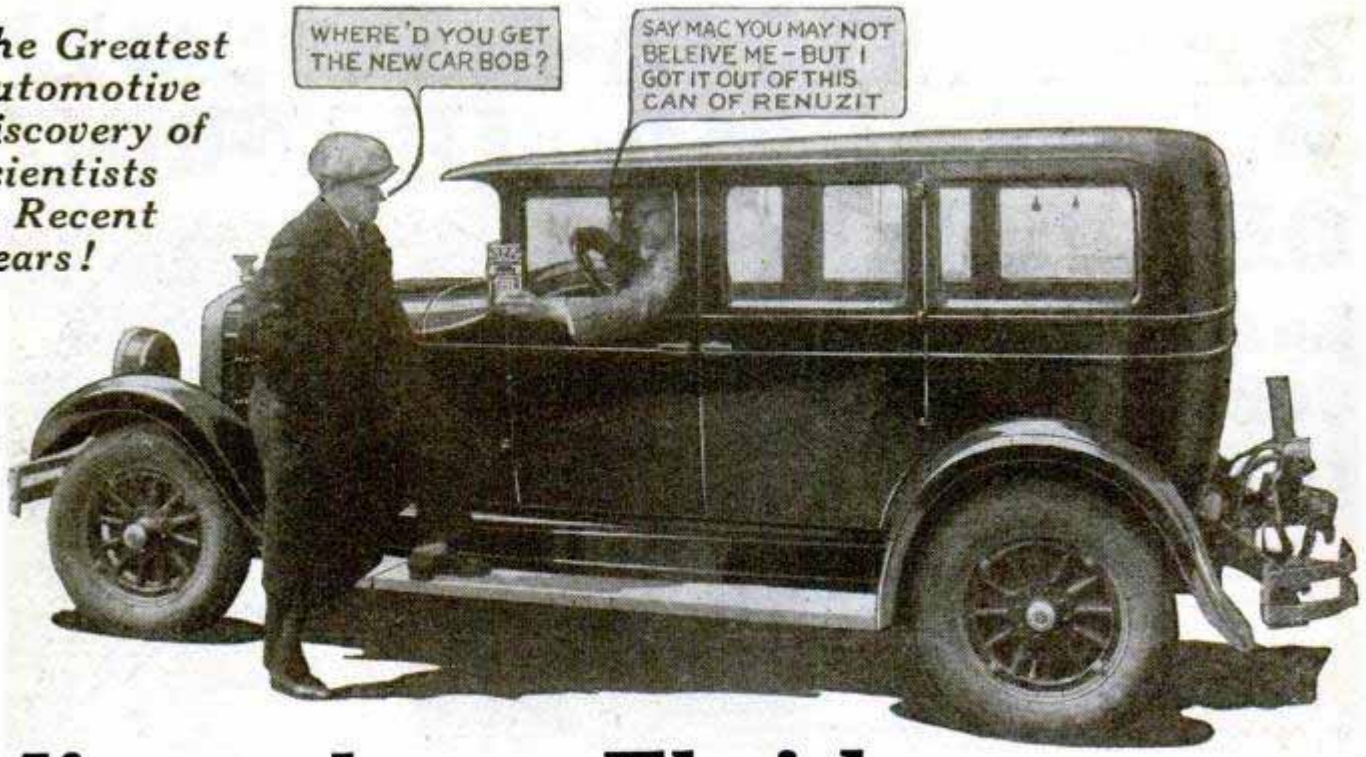
Name.....

Address.....

City.....State.....

Age.....Occupation.....

The Greatest Automotive Discovery of Scientists in Recent Years!



Miraculous Fluid Renews Original Finish of Old Cars *in 30 Minutes!*

Sounds like a Miracle! It IS a Miracle—a scientific Miracle that is astonishing the motor world! If YOU had seen Bob's car before he found out about ReNUZit, and could see it NOW—you'd hardly believe your eyes! It's as snappy looking as on the day he bought it. You'd want to try it on your own car right away. Yes, without doubt—ReNUZit is proving one of the great sensations of the motor age.

AGENTS—$50.00 a day

Not a Polish

Not a Paint

Not a Cleaner

Not a Wax

So like a Miracle is this wonderful Fluid that agents all over the country can make almost unbelievable profits. Full or spare time—ReNUZit sells like the wind. Car owners simply can't resist it! One glance at what it does—and they are more than eager to try it. And our proposition is so GOOD that no one could help making money with it. Live wires should make $50.00 and up a day without any trouble. If you are the man with selling sense we are looking for—you will realize at once what a big opportunity you have as a ReNUZit representative. It costs nothing to investigate. You can't afford not to.

ReNUZit Service Stations Bring $1,000 a Month

It is easy to see why so many men can get into the big money class operating ReNUZit Service Stations. By this we mean *real money*—$10,000 to $12,000 a year! They can make big incomes transforming Auto-Owners' *old* cars into *New* ones in 30 minutes! This is the sensational new business that is taking the motor world by storm. Send coupon for the thrilling story of ReNUZit and Your wonderful opportunity to make $12,000.00 a year. Do it Now!

How This Astounding Discovery Works

You just flow ReNUZit onto any automobile with a piece of cheesecloth and immediately the ORIGINAL color and lustre of that car is like new again. It's not a polish, cleaner, wax or paint—but a marvelous chemical discovery that restores the original color and glowing lustre of any painted, enameled or lacquered surface. No tiresome polishing or rubbing. Harmless—Lasting—Sure.

Curtan Mfg. Co.,
154 E. Erie St., Dept. 805-L.R.
Chicago, Ill.

Rush full details of ReNUZit, with Free Trial Offer. No obligation.

Name.....

Address.....

City.....

State.....

Car Stays Like New!

ReNUZit not only restores instantly the original smart sheen to any faded, dull or worn surface—but KEEPS IT THAT WAY. Simple to apply as "A B C"—Dries almost immediately. No trouble—No bother—No mess. Not even a brush is needed.

Test ReNUZit Free!

You have the privilege of trying ReNUZit yourself right now without risk or obligation. Prove to yourself what miracles it accomplishes. See your own car being transformed to a thing of glistening beauty! Send coupon TODAY for full details and Free Test Offer.

CURTAN MFG. CO.

154 E. Erie Street
Dept. 805-L. R. Chicago, Ill.

RENUZIT

MAIL COUPON NOW!

Muscles 5¢ apiece!

WOULDN'T it be great if we could buy muscles by the bag—take them home and paste them on our shoulders? Then our rich friends with money to buy them, sure would be socking us all over the lots.

But they don't come that easy, fellows. If you want muscle you have to work for it. That's the reason why the lazy fellow never can hope to be strong. So if you're lazy and don't want to work—you had better quit right here. This talk was never meant for you.

I Want Live Ones

I've been making big men out of little ones for over fifteen years. I've made pretty near as many strong men as Heinz has made pickles. My system never fails. That's why I guarantee my works to do the trick. That's why they gave me the name of "The Muscle Builder."

I have the surest bet that you ever heard of. Eugen Sandow himself said that my system is the [shortest and surest that America ever had to offer.

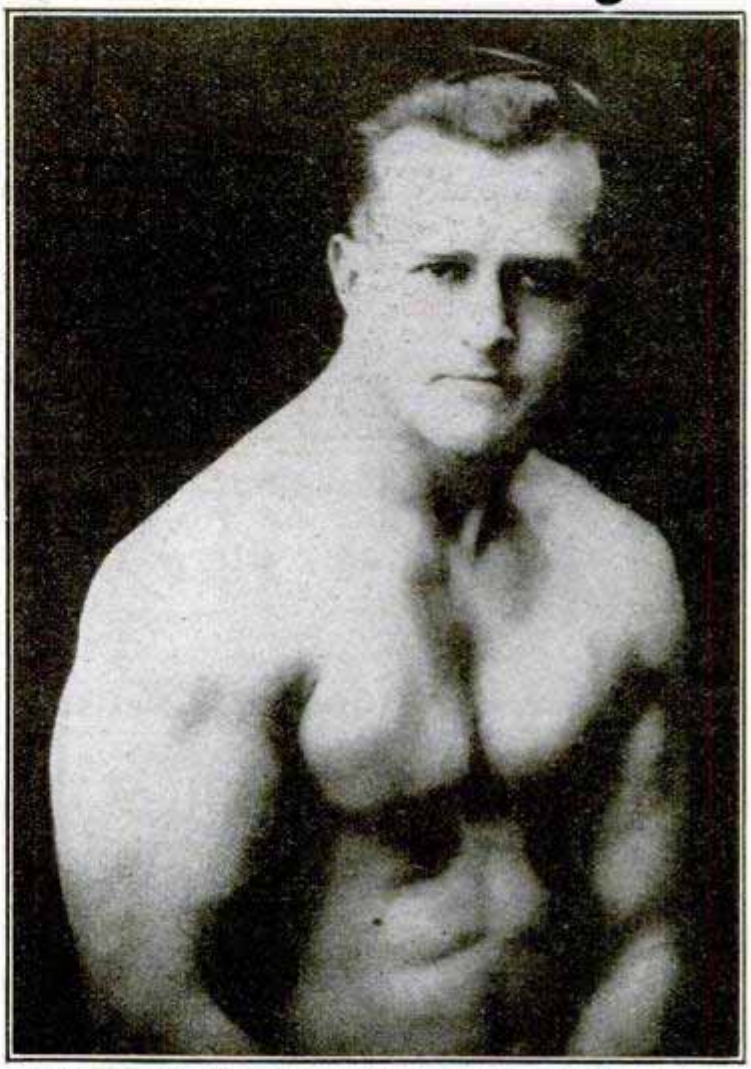
Follow me closely now and I'll tell you a few things I'm going to do for you.

Here's What I Guarantee to Do For You

In just 30 days I'm going to increase your arm one full inch. Yes, and add two inches to your chest in the same length of time. But that's nothing. I've only started; get this—I'm going to put knobs of muscles on your shoulders like baseballs. I'm going to deepen your chest so that you will double your lung capacity. Each breath you take will flood every crevice of your pulmonary cavity with oxygen. This will load your blood with red corpuscles, shooting life and vitality throughout your entire system. I'm going to give you arms and legs like pillars. I'm going to work on every inner muscle as well, toning up your liver, your heart, etc. You'll have a snap to your step and a flash to your eye. You'll feel the real pep shooting up and down your old backbone.

You'll stretch out your big brawny arms and crave for a chance to crush everything before you. You'll just bubble over with vim and animation.

Sounds pretty good, what? You can bet your old ukulele it's good. It's wonderful. And don't forget, fellow—I'm not just promising all this—I guarantee it. Well, let's get busy, I want some action—So do you.



EARLE E. LIEDERMAN, *the Muscle Builder*

Author of "Muscle Building", "Science of Wrestling and Jiu Jitsu", "Secrets of Strength", "Here's Health", "Endurance", Etc.

Send For My New 64 Page Book "Muscular Development"

IT IS FREE

Do you get that? It's free. I don't ask a cent. It's yours with my compliments. Take it and read it. It's the peppiest piece of literature you ever flashed your glimmers on. And 48 full-page photos of myself and some of my numerous prize-winning pupils. This is the finest collection of strong men ever assembled into one book—look them over—doctors, lawyers, merchants, mechanics and every line of trade you can think of. I swear you'll never let this book get out of your mitts again. And just think—you're getting it for nothing. Don't hesitate—no strings attached to it. Grab it.

Take your pen or pencil and fill out the coupon, or even your name and address on a postal will do—do it now before you turn this page.

Earle E. Liederman

Dept. 2008 305 Broadway, New York City

EARLE E. LIEDERMAN
Dept. 2008, 305 Broadway, New York City

Dear Sir:—Please send me absolutely free and without any obligation on my part whatsoever, a copy of your latest book, "Muscular Development." (Please write or print plainly.)

Name.....

Address.....

City.....State.....

BLISS ELECTRICAL SCHOOL

A special technical school with concise but comprehensive course in Electrical Engineering designed to be completed in ONE COLLEGE YEAR. Thorough knowledge of underlying principles emphasized.

ELECTRICAL ENGINEERING

The course is designed for earnest, ambitious young men of limited time and means. Curriculum includes mathematics, mechanical drawing and intensive shop work. Students construct motors, install wiring, test electrical machines. Graduates are qualified to enter the electrical field at once.

Bliss men hold responsible positions throughout the world. Thoroughly equipped fireproof dormitories, dining hall, laboratories and shops. **Prepare for your profession in the most interesting city in the world. School established 1893.** Catalog on request. Address

BLISS ELECTRICAL SCHOOL, 118 Takoma Avenue Washington, D. C.

LEARN CARTOONING

AT HOME DURING SPARE TIME

with the course that has trained HUNDREDS of beginners successfully. The Landon Picture Chart Method of teaching ORIGINAL drawing by mail makes cartooning easy to learn. This school is a Member of The National Home Study Council. Write today for sample picture chart to TEST YOUR ABILITY and examples of the work of successful students now earning from $50 to $200 and more per week. Enclose 6c in stamps and STATE YOUR AGE.

THE LANDON SCHOOL, 2838 National Bldg., Cleveland, Ohio

$100 a Week for Taking Pictures

We Furnish Camera and Teach You How

Men and Women Everywhere! Make Big Money!

WRITE FOR FREE BOOK Explains opportunities as Motion Picture Camera Man, Portrait, News or Commercial Photographer. You can learn at home or in our New York Studios. Spare or full time.

N.Y. Institute of Photography, 10 W. 33rd St., N.Y. Dept. 49

GIVEN TO YOU

Choose ANY $20 Musical Instrument

Yes, we will give you without extra cost a $20.00 quality **Violin, Tenor Banjo, Hawaiian Guitar, Banjo, Banjo-Guitar, Cornet, Guitar, Mandolin or Banjo-Mandolin.** Learn to play by note. We teach men, women, boys and girls by mail. Amazing new, simplified method. A few cents a day pays for Lessons. Instrument and first lesson sent on FREE TRIAL. Over 500,000 successful pupils. Write today.

CHICAGO CORRESPONDENCE SCHOOL OF MUSIC, INC.
1632 North Halsted Street, Dept. 707, Chicago, Illinois.

FLY

Get Into Practical Aviation

This large commercial transport-training Company will accept and train a limited number of additional men intensively or in spare time or by home study for good pay positions as pilots or ground mechanics. Only U. S. licensed, latest type planes, pilots and instructors. Complete shops; modern hangar on country's busiest air mail field. Employment service to help pay training and living expenses. Write your name, age and address and state experience on margin of this page; then tear out and mail at once. Full details and copy of Airway, valuable book, will be sent to you.

AVIATION SERVICE & TRANSPORT, Inc.
Dept. P. M. 8, 203 N. Wabash Ave. Chicago

FREE!

DRAFTING—*Learn at home*

F. E. KING was "a poorly paid clerk" when he enrolled for the home-study Drafting Course of the International School of Drafting. Through study and perseverance he became Chief Draftsman of the U. S. Steel Furniture Co. He is now earning more in a day than he used to earn in a week.

A. J. Hutchins became Chief Draftsman for the American Strawboard Company and increased his salary 300%—also as a result of our training.

There is no doubt that Drafting offers a real opportunity to ambitious men and it will pay you to investigate it.

INTERNATIONAL SCHOOL OF DRAFTING
Division of the International Correspondence Schools
Box 5552-F, Scranton, Penna.

Without cost or obligation, please send me full details of your home-study course in

☐ Drafting ☐ Civil Engineering
☐ Mechanical Engineering ☐ Architect
☐ Contractor and Builder ☐ Architects' Blueprints

Name.....

Address.....

Mail Coupon for Free Booklet

MONOTONY ROUTINE LONG HOURS LOW PAY

Human cogs in a great machine. No chance to meet people, travel, or have interesting experiences. A long, slow, tiresome road that leads nowhere.

The Time Clock—a badge of hawk-like supervision and The Rut. A constant reminder that one is "just another name on the payroll."

Always worrying over money. Always skimping and economizing—going without the comforts and luxuries that every man DESERVES for his family and himself.

Always wondering what would happen in case of a "lay-off" or loss of job. No chance to express ability—no chance to get ahead. COULD there be a way out?

I Said "Good-bye" to It All After Reading This Amazing Book—

Raised My Pay 700%!

Where Shall We Send Your Copy . . . Free?

WHEN a man who has been struggling along at a low-pay job suddenly steps out and commences to earn real money—$5000, $7500, or $10,000 a year—he usually gives his friends quite a shock. It's hard for them to believe he is the same man they used to know. . . but such things happen much more frequently than most people realize. Not only one, but HUNDREDS have altered the whole course of their lives after reading the amazing book illustrated at the right.

True, it is only a **book**—just seven ounces of paper and printer's ink—but it contains the most vivid and inspiring message that any ambitious man can read! It reveals facts and secrets that will open almost any man's eyes to things he has never even **dreamed** of!

Remarkable Salary Increases

For example, R. B. Hansen of Akron, Ohio, is just one case. Not long ago he was a foreman in the rubber-curing room of a big factory at a salary of $160 a month. One day this remarkable volume, "Modern Salesmanship," fell into his hands. And from that day on, Mr. Hansen clearly saw the way to say, "Good-bye" forever to low pay, long hours, and tiresome routine! Today he has reaped the rewards that this little volume placed within his reach. His salary runs well into the 5-figure class—actually exceeding $10,000 a year!

Another man, Wm. Shore of Neenach, California, was a cow-boy when he sent for "Modern Salesmanship." Now he is a star salesman making as high as $525 in a single week. O. D. Oliver of Norman, Oklahoma, read it and jumped from $200 a month to over $10,000 a year! C. V. Champion of Danville, Illinois, raised his salary to over $10,000 a year and became President of his company in the bargain!

A Few Weeks—Then Bigger Pay

There was nothing "different" about any of these men when they started. None of them had any special advantages—although all of them realized that SALESMANSHIP offers bigger rewards than any other profession under the sun. But, like many other men, they subscribed to the foolish belief that successful salesmen are born with some sort of "magic gift." "Modern Salesmanship" showed them that nothing could be farther from the truth! Salesmanship is just like any other profession. It has certain fundamental rules and laws—laws that you can master as easily as you learned the alphabet.

City and traveling sales positions are open in every line all over the country. For years, thousands of leading firms have called on the N.S.T.A. to supply them with salesmen. Employment service is free to both employers and members and thousands have secured positions this way.

FREE TO EVERY MAN

See for yourself WHY "Modern Salesmanship" has been the deciding factor in the careers of so many men who are now making $10,000 a year. Learn for yourself the REAL TRUTH about the art of selling! You do not risk one penny or incur the slightest obligation. And since it may mean the turning point of your whole career, it certainly is worth your time to fill out and clip the blank below. Send it now!

NATIONAL SALESMEN'S TRAINING ASS'N.

Dept. K-101, N. S. T. A. Bldg., Chicago, Ill.

National Salesmen's Training Ass'n.
Dept. K-101, N.S.T.A. Bldg.,
Chicago, Ill.

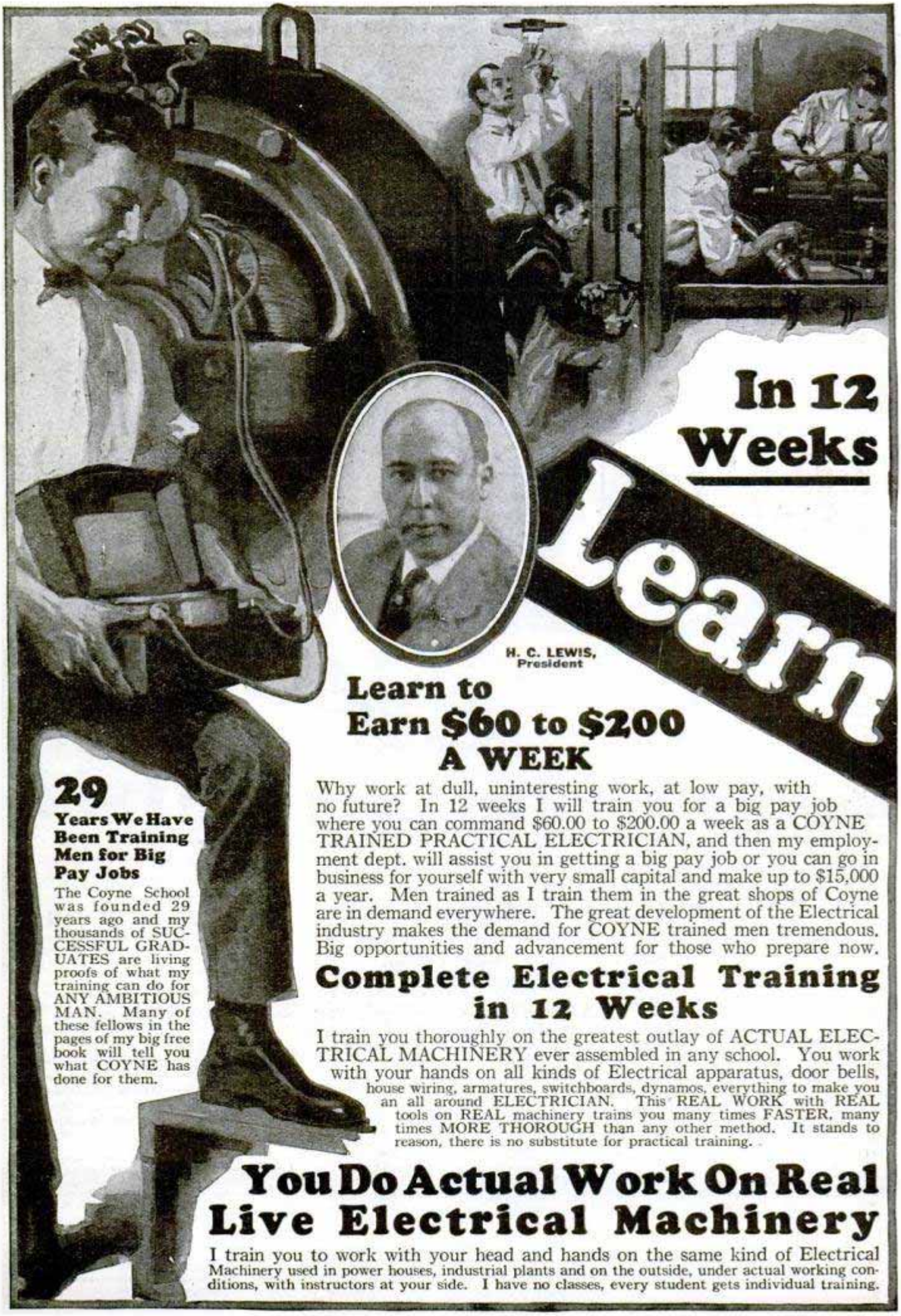
Without cost or obligation, you may send me your free book, "Modern Salesmanship."

Name.....

Address.....

City.....State.....

Age.....Occupation.....



In 12 Weeks Learn

H. C. LEWIS,
President

Learn to Earn $60 to $200 A WEEK

Why work at dull, uninteresting work, at low pay, with no future? In 12 weeks I will train you for a big pay job where you can command $60.00 to $200.00 a week as a COYNE TRAINED PRACTICAL ELECTRICIAN, and then my employment dept. will assist you in getting a big pay job or you can go in business for yourself with very small capital and make up to $15,000 a year. Men trained as I train them in the great shops of Coyne are in demand everywhere. The great development of the Electrical industry makes the demand for COYNE trained men tremendous. Big opportunities and advancement for those who prepare now.

29
Years We Have Been Training Men for Big Pay Jobs

The Coyne School was founded 29 years ago and my thousands of SUCCESSFUL GRADUATES are living proofs of what my training can do for ANY AMBITIOUS MAN. Many of these fellows in the pages of my big free book will tell you what COYNE has done for them.

Complete Electrical Training in 12 Weeks

I train you thoroughly on the greatest outlay of ACTUAL ELECTRICAL MACHINERY ever assembled in any school. You work with your hands on all kinds of Electrical apparatus, door bells, house wiring, armatures, switchboards, dynamos, everything to make you an all around ELECTRICIAN. This REAL WORK with REAL tools on REAL machinery trains you many times FASTER, many times MORE THOROUGH than any other method. It stands to reason, there is no substitute for practical training.

You Do Actual Work On Real Live Electrical Machinery

I train you to work with your head and hands on the same kind of Electrical Machinery used in power houses, industrial plants and on the outside, under actual working conditions, with instructors at your side. I have no classes, every student gets individual training.

In the Great Shops of COYNE

Radio and Auto Courses Included

For a short time I am including WITHOUT EXTRA COST my big new Radio and Auto Truck and Tractor Electrical course. Two big courses for the price of one for a limited time only.

You Don't Need Advanced Education or Experience

You don't need a lot of schooling to master my course. You don't have to be a high school graduate; many of my successful graduates never even completed the grammar schools. My method of instruction is clear and plain, yet thorough, and if you can understand plain English I will make you a practical Electrician, even though you haven't a lot of education or no previous electrical experience.

COYNE BACKS YOU FOR LIFE

You get FREE a life scholarship which enables you to stay longer than the required time if you care to, or you may return at any time to take up new work which is constantly being added to make my school the most modern at all times. In addition to this I give you **Lifetime Employment Service,** consultation service and other help—not only to **Make You a Success,** but to help you hold it after you get it.

Electricity

GET MY FREE BOOK

This big, handsome book, size 12x15 inches, just off the press, shows actual photographs of my big shops. Cost me over a dollar a piece to print, but it's yours if you will mail the coupon. Clip it *now*, fill out and drop in the mail box today. You owe it to yourself to get the facts.

H. C. LEWIS, Pres.
COYNE Electrical School
Dept. C-872
500 South Paulina St.
CHICAGO ILL.

Railroad Fare to Chicago Allowed

Come to Chicago at my expense. I will pay your railroad fare to Chicago from any point in the United States.

Big, Newly Enlarged Course

I have enlarged my course, added new departments, additional equipment and made my course even greater than ever.

EARN WHILE YOU LEARN

My Employment department will assist students to secure part time work where they can make a good part of their living expenses while training, and will assist them to get a big pay job when they graduate.

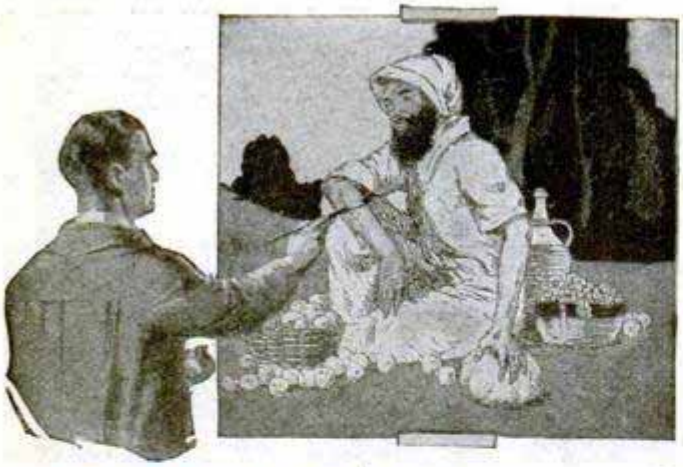
H. C. LEWIS Pres.
COYNE Electrical School
Dept. C-872
500 South Paulina Street
CHICAGO, ILL.

Dear Sir: Please send me free your big new book and full particulars of your special offer of RAILROAD FARE and two extra courses that are included.

Name.....

Address.....

Town.....*State*.....



DRAWING *is a way to* FORTUNE

ALI HAFED, a Persian, sold his farm and went away to seek his fortune. The man who bought the farm found it contained a diamond mine which made him fabulously rich. Ali Hafed overlooked the great opportunity at his door to go far afield in search of wealth. This old story illustrates a great truth.

Do you like to draw? If you do, you may have talent, a talent which few possess. Then don't follow Ali Hafed's example and look farther for fortune. Develop your talent—your fortune lies in your own hand!

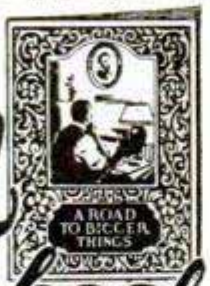
Many Earn $200 to $500 a Month

Present opportunities in the field of illustrating were never excelled. Publishers buy millions of dollars' worth of illustrations every year. Illustrating is fascinating as well as profitable.

The Federal Course includes illustrating, cartooning, lettering, poster designing, window card illustrating, etc.

The Federal Staff of authors includes such nationally known artists as Sid Smith, Neysa McMein, Fontaine Fox, Charles Livingston Bull, Clare Briggs, Norman Rockwell and over fifty others. Exclusive lessons and drawings especially prepared by them are included in the Federal Home Study Course. They guide you from simple sketches to complex illustrations having a high market value.

Mail in the coupon below today and we will send you our FREE illustrated booklet, "A Road to Bigger Things."



Federal School of Illustrating

FEDERAL SCHOOL OF ILLUSTRATING,
8138 Federal School Bldg.,
Minneapolis, Minn.

Name.....Age.....

Occupation.....

Address.....

.....

THE CHICAGO DAILY NEWS
School and College Bureau

Offers You Its Specialized Services in Choosing a School

Last year the School and College Bureau of The Chicago Daily News saved many busy parents and questioning boys and girls both time and worry by sending them prompt, reliable information about just the kind of school they wanted—personal requirements as to location and tuition charges being considered in each individual case.

Again this year many young people will be perplexed by the problem of finding the right school. Why not let us help you?

The Chicago Daily News maintains this service absolutely free of charge to you. No need to hurriedly select a school on mere hearsay when expert advice can be obtained by telephoning Dearborn 1111, writing or calling for a personal interview at

THE CHICAGO DAILY NEWS
School and College Bureau
Dept. K, 15 N. Wells St., Chicago, Illinois

LEARN WATCH REPAIRING

You can learn by our modern and original system of instruction every part of the **Watch Repairing Trade** at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn from $50 to $75 per week. For particulars apply to the
Wisconsin School of Watch Repairing
166 Mason St., MILWAUKEE, WIS.

LEARN PIANO TUNING AT HOME

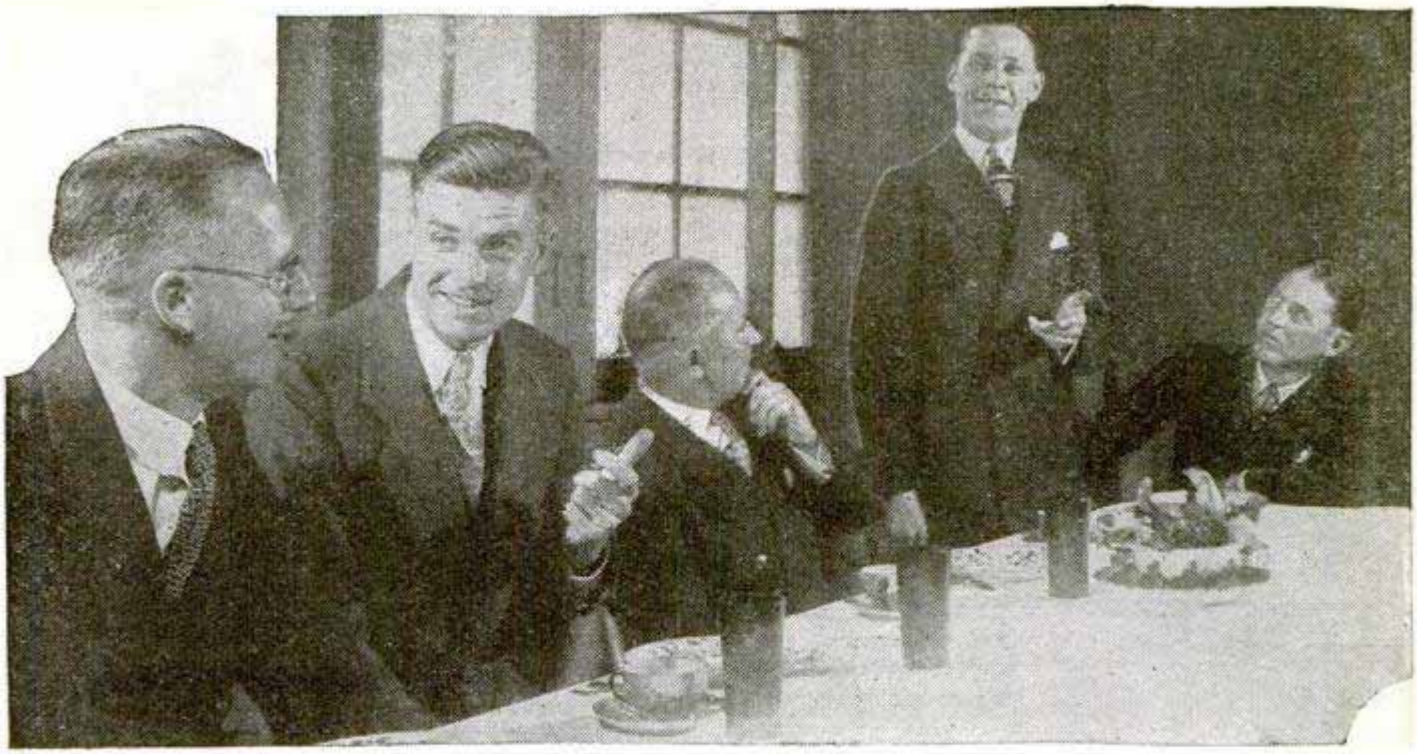
Send for FREE copy of the 30th ANNIVERSARY EDITION of our book, "Winning Independence". Read how students master tuning with our TUNE-A-PHONE, and WHY our graduates head the profession in all parts of the world. With Bryant's patented devices, tools, charts and lessons, one learns quickly and easily. Low tuition; easy terms. Diploma granted. MONEY-BACK if not satisfied. $10.00 to $25.00 a day, exceptional opportunities and an ideal profession awaits you.
BRYANT SCHOOL OF TUNING, 31 Bryant Bldg., Augusta, Michigan

IF YOU STAMMER

Write for my free book "Millard's Advanced Natural Corrective Course" and a free copy of my speech magazine. 10,000 cases successfully treated. Est. 24 years. Largest school for stammerers in world.
Millard Inst. of Normal Speech, 2317 Millard Bldg., Milwaukee, Wis.

Learn Photography at HOME

Make money taking pictures. Prepare quickly during spare time. Also earn while you learn. No experience necessary. New easy method. Nothing else like it. Send at once for free book, OPPORTUNITIES IN MODERN PHOTOGRAPHY and full particulars
AMERICAN SCHOOL OF PHOTOGRAPHY
Dept. 135-C 3601 Michigan Ave. Chicago, U. S. A.



"They Snickered When I Got Up To Speak"

—But from the First Word, I Held Them Spellbound

THE banquet hall was crowded. Suddenly I heard the chairman's voice say—"We will now have a few words from Mr. Byron Munn." It came like a flash of lightning! He was unexpectedly calling on *me* for a speech!

As I started to get up, I heard a titter run around the table.

"Watch him make a fool of himself," I overheard someone whisper. "He's so bashful he's afraid of his own voice."

I knew they were expecting me to make myself ridiculous, but I only grinned inside.

I stood squarely on my two feet and started in!

"But When I Commenced to Speak"—

Almost from the first word, the smiles and derision faded from their faces. They were incredulous—amazed! Instantly the atmosphere became so tense that you could have heard a pin drop! No snickers nor sneers *now!* My voice, clear as a bell—strong, forceful, unfaltering—rang out through the banquet hall as I hammered home each point of my message with telling strokes! I let myself go—soaring to a smashing finale that almost brought them to their feet!

When I finished, there was an instant of dead silence! And then it came—a deafening wave of applause rolling up from one hundred pairs of hands—spontaneous, excited, thrilling!

What 20 Minutes a Day Will Show You

How to talk before your club or lodge.
How to address board meetings.
How to propose and respond to toasts.
How to make a political speech.
How to tell entertaining stories.
How to make after-dinner speeches.
How to converse interestingly.
How to write letters.
How to sell more goods.
How to train your memory.
How to enlarge your vocabulary.
How to overcome stage fright.
How to develop self-confidence.
How to acquire a winning personality.
How to be the master of any situation.

Was Once a "Human Clam"

After it was all over, Jack Hartray fell into step beside me as I left the hall. "Gee, that was a great speech!" he said enthusiastically. "You certainly raised yourself about 100% in the eyes of every person in that place tonight. . . . And yet they used to call you 'a human clam'—and the quietest man in the office!"

It was true, too. All my life I *had* been handicapped with a shy, timid and retiring nature. With only a limited education, I never could express my ideas in a coherent, forceful way. As a result I saw dozens of men with less ability pass me by simply because they were good talkers and knew how to create the right impression. It was maddening.

A Lucky Accident

At last I accidentally ran across a little book entitled *How to Work Wonders With Words*. Between its covers I discovered certain facts and secrets I had never dreamed of. Difficulties were swept away as I found a simple way to overcome timidity, stage-fright and self-consciousness—and how to win advancement, popularity and success.

Today I hold the sort of position that I had always envied. My salary has been increased! I am not only in constant demand as a speaker in public but I am asked to more social affairs than I have time to attend. To sum it all up, I am meeting worth-while people, earning more than I ever dared expect and enjoying life to the fullest possible degree! And furthermore, the *sheer power of convincing speech* has been the big secret of my success!

The experience of Byron Munn is typical. Not only men who have made millions, but thousands of others have found success after learning the secrets of powerful, effective speech. Being able to say the right *thing* in the right *way* at the right time has perhaps been responsible for more brilliant success than any other one thing under the sun!

Get This Amazing Book FREE!

Right now, we offer to send you absolutely free, a copy of *How to Work Wonders With Words*. This remarkable little book will show you how to develop the priceless "hidden knack" of effective speech that has brought success, social position, power and wealth to so many. It will open your eyes to a new realization of what life holds in store. See for yourself! There is no obligation. You can obtain your copy free by just sending the coupon.

NORTH AMERICAN INSTITUTE
Dept 135-C
3601 Michigan Ave. Chicago, Ill.

Now Sent FREE

North American Institute, Dept. 135-C, 3601 Michigan Ave., Chicago, Ill.

Please send me FREE, without obligation, my copy of your inspiring booklet *How to Work Wonders With Words* and full information regarding your Course in Effective Speaking.

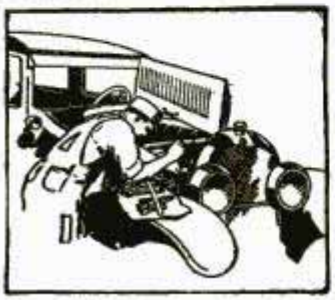
Name.....

Address.....

City.....State.....

AUTO
BOOKS SENT FREE!

Mail the coupon and we'll send you a set of these remarkable auto books, just off the press. Whether you are mechanic or helper, expert or student, auto-owner or driver, if you're interested in autos, by all means take advantage of this opportunity to see the latest and most complete work on autos we have ever published. Built by eighteen of America's greatest automotive engineers. Simple enough for men with little schooling to understand, yet in daily use by hundreds of engineers, service station superintendents and foremen as an authoritative REFERENCE Cyclopedia.



CAN YOU FIX IT?

Can you take out "play" in differential? Can you kill the "shimmy" in steering? Can you reset TIMING? Can you put your finger on engine trouble without guessing or tinkering? Can you pull the starter off and fix it? Can you adjust and repair transmission, engine, rear axle, bearing?

Put the JIFFY INDEX to work for you!

The billion-dollar auto industry offers rich prizes to men with gumption enough to really learn all branches of automotive mechanics. A better job, bigger pay—a chance to go into business and get a share of the huge profits, are waiting for any man who even half tries to improve his ability to deliver service. And here's the shortest, easiest way: No tedious studying, no memorizing, no lessons or examinations. Just LOOK UP the facts you seek. You'll find the answer to any auto problem literally at your finger-tips, in the famous JIFFY INDEX.

"Was garage hand—now have shop of my own," writes W. Sidle of Tobaso, O. "I got a raise," says F. Ervin of Yarmouth, N. S., shortly after getting his books. And D. S. Reid of Siluria, Ala., was offered $4000 for invention worked out with these Auto Books.

These Books Tell How

and they tell you how to do any and every auto job right the first time.

5 Big Volumes

2400 pages, over 2000 illustrations, wiring diagrams, equipment charts, etc. De Luxe edition with gold-stamped flexible binding. Sent FREE for 15 days' use. If not wanted return express collect. If kept, send only $2 after 15 days, then $3 a month until special advertising price, $24.80, is paid.

A Year's Consulting Membership FREE!

Privilege of consulting engineers of million-dollar American Technical Society on any automotive problem for one year without charge, if you mail coupon immediately.

American Technical Society

Dept. AC-19, Drexel Ave. & 58th St. Chicago, Ill.

Dont Send a Penny!

AMERICAN TECHNICAL SOCIETY
Dept. AC-19, Drexel Ave. & 58th St., Chicago, Ill.

I would like to see the new 5-volume edition of your AUTO BOOKS, but without obligating me to buy them. I will pay the few cents delivery charges only, but if I choose to, I will return them express collect. If after 15 days' use I prefer to keep them, I will send you $2 and pay the balance at the rate of only $3 a month, until $24.80 is paid. Please include free membership you offer above.

Your Name.....

Your Address.....

Employer's Name.....

Employer's Address.....

25th Year

CHICAGO TECHNICAL COLLEGE

Engineering
Architecture
Electricity
Drafting

Intensely practical training. 2 year Diploma; 3 year B. S. Degree; special 3 and 4 months' short courses. Courses adapted to your needs. No time wasted. Expert instructors. Graduates in constant demand. Opportunities for self-support while studying. Day and evening classes. Athletics. Enter any time. Low tuition—easy terms. Desirable boarding accommodations. Write today for your copy of 80-page illustrated Blue Book, mailed free.

Chicago Technical College
Dept. K-76, 118 East 26th Street, Chicago

LEARN WATCH REPAIRING

Be a watchmaker—you can learn this profitable trade by correspondence in a few weeks in your own home by the DeSelms Chart System. After you complete the course you will know a watch from A to Z. You will know just what the matter is and how to repair one. When you graduate you will be a practical watchmaker and repairer and competent to fill any position. Positions for our graduates. Ask for our Free Book. It explains our system and terms.

THE DeSELMS WATCH SCHOOL
LOGANSPORT, INDIANA

1,000 Hotel Positions Open!

HOTELS, restaurants, clubs, apartments, hospitals, institutions, schools and colleges everywhere need trained men and women. Over 70,000 high-class positions paying $2,500 to $10,000 a year open annually in the hotels of the United States. Nearly one and three-quarter billions of dollars' worth of NEW HOTELS, CLUBS AND INSTITUTIONS being built this year will need over 200,000 trained men and women. Hotels start you at salaries up to $3,500 a year, with living usually included. At any time there are over 1,000 hotel positions open.

Previous Experience Unnecessary

You can have one of these fascinating, big-pay positions. Thru our Simplified Study Plan we give you the valuable knowledge that it has taken some of the most successful hotel men years to obtain. Age is no obstacle—young and old alike have equal chance for success. Past experience absolutely unnecessary. A common school education is all you need.

We train you in your spare time and put you in touch with big opportunities. All of your training under the personal supervision of Clifford Lewis, Managing Consultant for over 225 hotels thruout the United States. Our students employed by leading hotels everywhere.

Send coupon today for Free Book, "*Your Big Opportunity*," showing how we can train you for one of these splendid positions and explaining our Money-Back Agreement.

FREE BOOK COUPON

LEWIS HOTEL TRAINING SCHOOLS,
Room AY-385, Washington, D. C.

Send me without obligation the Free Book "Your Big Opportunity."

Name.....

Address.....

City..... State.....

A Challenge Made Me Popular!

"A BOX of cigars says you don't *dare* dance with her—Wallflower!" That was the challenge they flung at me!

My sporting blood boiled! "All right, I accept!" I responded. And I started across the floor.

I NEVER was much of a dancer. But when our club gave this affair I couldn't stay away. Even now, I should have been sitting safely on the "sidelines"—if only the fellows hadn't made that sarcastic remark.

"Show them you can do it! Show them you can dance as well as they!" my pride whispered. And I would!

But halfway across the hall my courage died. I was nearly paralyzed with fright. There she was, waiting expectantly—Marion Blake, an exquisite dancer—graceful, poised, at ease. Suppose she should refuse? Suppose she should leave me in the center of the floor? Oh, wouldn't the fellows chuckle then!

The Unexpected Happens

"I'm—I'm sorry"—I stammered. "I guess——"

"Why, of course, I'll be glad to dance!" she interrupted. And before I realized it we were swallowed up in the dancing throng.

What a terrible ordeal it was for me! And twice as bad for her. I stumbled through the steps. I trod on her toes. I tried desperately to keep in time with the music. Yes, my dancing was inexcusable—hopelessly out-of-date!

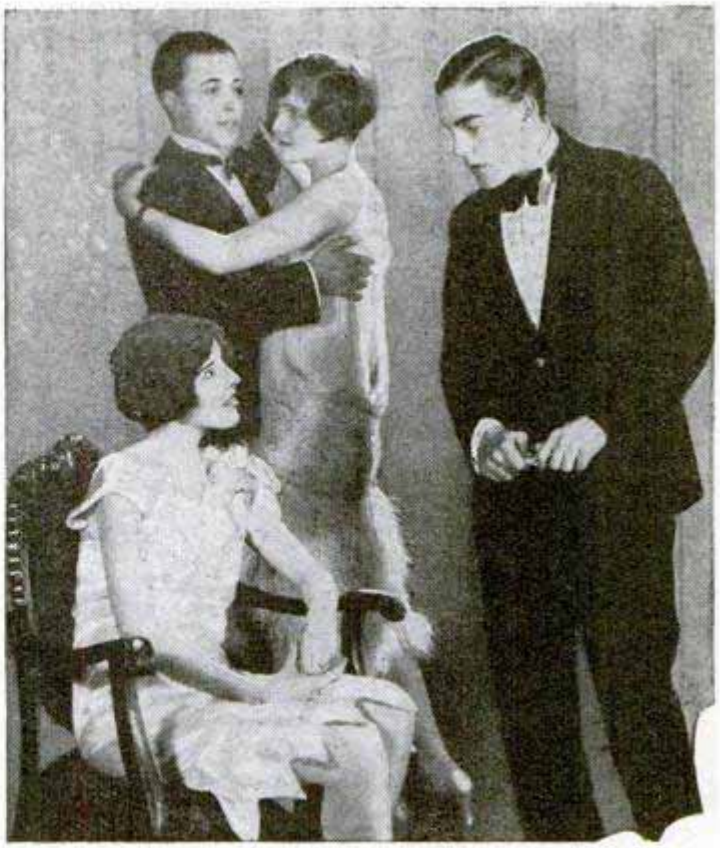
Suddenly she suggested that we sit out the rest of the number. I blushed furiously "Now, it's coming!" I thought. "Now, she is going to tell me what she thinks of my nerve!"

But I was in for the surprise of my life. "Jim," she began softly. "I'll be frank. You're not the best dancer in the world. But you're certainly not the worst. What you need is 'brushing up' on the latest steps. Why don't you get in touch with Arthur Murray?"

"Arthur Murray! Arthur Murray!" I repeated. "He teaches dancing by mail. You can't learn that way!"

"No?" and Marion arched her eyebrows. "The truth is, that's *exactly* the way I learned—even though no one *does* suspect it!"

Naturally I was astounded, but the next evening I found one of Arthur Murray's ads and clipped the coupon. Then I mailed it, asking for his free booklet and five free lessons. If Marion could become a wonderful dancer that way it was certainly worth investigation—especially since I didn't risk a penny.



I was nearly paralyzed with fright. There she was, waiting expectantly—Marion Blake, an exquisite dancer—graceful, poised, at ease. Suppose she should refuse? Suppose she should leave me in the center of the floor?

I Find the Secret!

The booklet and free lessons came promptly. What a revelation! They showed me how many mistakes I had been making—how *utterly ignorant* I was of the modern style of dancing, yet in a few evenings I had learned the modern Waltz—the modern Fox Trot and many delightful variations of the *very latest* steps—without music, partner or teacher!

I Turn the Tables

A week later I attended a dance. The old crowd was there. "Here he is again!" they chorused. "Give him the cigars! He earned them!" Imagine how surprised they were when I asked Marion to dance! They stood open-mouthed as I glided around the floor like an expert! Now girls are always delighted to dance with me. I laugh when I think how scared I was that terrible evening—for everywhere I go I am welcomed as an accomplished dancer!

Will YOU Accept These 5 FREE Lessons?

No matter how poorly you dance now—no matter if you've never even been on a dance floor in your life—Arthur Murray's method makes you a finished dancer in 10 days, or you don't have to pay a penny. To prove it he is willing to send you five lessons from his remarkable course *absolutely free!* Just mail coupon (with 10c to cover cost of printing and mailing) and these valuable lessons will be forwarded at once. Also a free copy of his new book, "The Short Cut to Popularity." Mail coupon *NOW!*

Arthur Murray, Studio 828, 7 East 43rd Street, New York City.

Arthur Murray, Studio 828,
7 East 43rd Street, New York City

To prove that I can learn to dance at home in ten days you may send the FIVE FREE LESSONS. I enclose 10c (stamps or coin) to pay for the postage, printing, etc. You are to include free "The Short Cut to Popularity."

Name.....

Address.....

City.....State.....

See how easy it is to learn the Arthur Murray way!

Before Kenneth McCarty Mailed that Coupon He was an $18.00 Clerk—

Today His Income is $85.00 a Week

After completing the course he wrote us: "Yours is the finest course ever presented for the Tenor Banjo. Before I enrolled with you, I knew nothing whatever about music. I was earning $18.00 weekly clerking in a store. **Little did I realize the opportunity that had come.** I took up the course just for fun. But here I am playing in one of the best orchestras in Western Michigan and **making $85.00 a week.** Your course and your kind co-operation have made me a professional Tenor Banjoist."—*Kenneth McCarty, Parkview Hotel, South Haven, Mich.*

Play for Fun or $5,000 a Year

Whether a salary of $65 to $100 a week—or spare time playing at $5, $10, $15 or more a night—interests you or not—think of the fun in store for you. In one to three months we can train you at home to play this marvelous, melodious instrument with a fine easy skill that will make you the envy of all other eyes. Think, too, of the pleasure of being able to express yourself musically when alone! You're passing up the **best times** of your life if you pass up an opportunity like this to learn at slight cost and with no inconvenience at all the world's most popular instrument. DON'T DO IT! Decide NOW to learn more about The Play-Way—the quickest, surest short-cut ever devised to social and professional success.

You Get Phonograph Records, Too

Every selection of the course, fifty-five in all—comes to you on a phonograph record. You hear the instructor's playing just as though he were right at your side. The Play-Way is different, interesting, FOOL PROOF. Get the good news the coupon brings. SEND FOR IT NOW!

FREE Book Tells How

Send at once for "The Play-Way to Popularity and Big Pay." Learn all about our unique method of training you at home, about the big, professional size Tenor Banjo, Phonograph Records and complete Outfit that we send you along with your very first lesson. Undreamed of possibilities for pleasure, popularity and big pay are open to you the minute you "become good." The book below is your first step. Take it now. Clip the coupon while it's here before your eyes.

Get Big Free Book

A. F. Bloch, President
NEW YORK ACADEMY OF MUSIC,
Studio 1088, 100 Fifth Avenue,
New York City.

Send me the book that started McCarty. No obligation whatsoever on my part, understand.

Name.....

Address.....

$25.00 DRAWING COURSE for $2.98

Haven't you often wished that you could draw cartoons, illustrate some idea, sketch some pretty face, etc.? You can do all of these things. One of America's most famous Cartoonists and Illustrators has developed a great, simple system for success in all branches of Commercial Art. This system has revolutionized the entire theory of drawing. It means that drawing can be as easy for you as writing — much simpler than learning shorthand, bookkeeping or typewriting. We are now placing this original system for learning Drawing, Art and Cartooning, consisting of 34 lessons with over 500 illustrations, within reach of every one. If you will devote a few hours each week to the Course WE ABSOLUTELY GUARANTEE that you will learn to draw and draw well before you have half finished the Course. If we fail to make this claim good, we will refund every cent paid us. By eliminating a large office force for answering correspondence, expensive catalogs, etc., we are enabled to make a price of $2.98, the cheapest price ever known for a high-grade, home study course. Many have sent us letters similar to that of Rob't P. Davis of Detroit, who wrote: "I can't see how you ask so little. It is more than I expected." Learn to draw. It is a big asset, no matter what field you are in.

Send No Money

Just order the course and on arrival pay postman **$2.98** plus a few cents postage, payment in full for the entire Course and Drawing Outfit. If not entirely satisfied, return within five days and we will Refund Money. Address:

If you order the course at once, we will include a drawing outfit, consisting of artist's pencils, pens, paper, erasers, thumb tacks, etc., enabling you to go to work without any additional cost.

LEDERER SCHOOL of DRAWING, Dept. 9502-Z, Chattanooga, Tenn.
Orders from outside the U. S. A. are payable $3.28 cash with order.

Write Like This

Wonderful, new device, guides your hand; correct your writing in few days. Big improvement in three hours. No failures. **Complete outline FREE.** Perfect Penmanship Inst. D-34, St. Louis, Mo.

LEARN WATCHMAKING

and become Independent. We help you secure a position. Easy to learn. Send for FREE CATALOG.
ST. LOUIS WATCHMAKING SCHOOL, Dept. 5. ST. LOUIS, MO.

WHY NOT spend Spring, Summer and Fall gathering butterflies, insects? I buy hundreds of kinds for collections. Some worth $1 to $7 each. Simple outdoor work with my instructions, pictures, price-list. Send 10 cents (not stamps) for my illustrated Prospectus before sending butterflies.
MR. SINCLAIR, DEALER IN INSECTS,
Dept. 6. Box 1424. San Diego, Calif.

CHEMISTRY

Complete, practical home-study courses prepared by some of the best-known chemists in this country, including ALLEN ROGERS, B.S., M.S., Ph.D.—Head of Department of Industrial Chemistry, Pratt Institute; L. M. TOLMAN, Ph.D.—Formerly Chief Chemist, Wilson & Co. Now Vice-president, United Chemical and Organic Products Co.; BRADLEY STOUGHTON, B.S.—Head of the Department of Metallurgy, Lehigh University, and OWEN L. SHINN, Ph.D.—Professor of Applied Chemistry, University of Pennsylvania.

Mail Coupon for Free Booklet

INTERNATIONAL SCHOOL OF CHEMISTRY
Associated with the International Correspondence Schools
Box 5556-F, Scranton, Penna.

Without cost or obligation, please send me full details of your home-study course in

- ☐ Analytical Chemistry
- ☐ Chemical Engineering
- ☐ Industrial Chemistry
- ☐ Metallurgical Chemistry
- ☐ Short Chemistry Course
- ☐ Pharmacy

Name.....

Address.....

ACCOUNTING

How to learn *Accounting*

THOUSANDS of ambitious men are earning more money today because they know Accounting. Send for our 80-page book, "How to Learn Accounting," and the first lesson. Both will be sent *free*.

International Accountants Society, Inc.
A Division of the
ALEXANDER HAMILTON INSTITUTE
Dept. 65, 3411 So. Michigan Ave., Chicago, Ill.

"STAMMERING
Its Cause and Cure"

You can be quickly cured if you stammer. Send 10 cents coin, or stamps, for 288 page cloth bound book on Stammering and Stuttering. It tells how I cured myself after Stammering and Stuttering for 20 years. **BENJAMIN N. BOGUE**
11108 Bogue Building, 1147 N. Ill. St. Indianapolis

Test Your Art Ability, FREE

Do you like to draw? Our simple scientific Art Ability Questionnaire will tell if your talent is worth developing and how much training you will need. Your true score given. Commercial artists make big money. Learn at home, in spare time, with the Federal course. Write today for your Questionnaire; giving age and occupation.
FEDERAL SCHOOL OF COMMERCIAL DESIGNING
636 Federal Schools Bldg. Minneapolis, Minn.

Study LAW AT HOME

Lincoln did it! Also thousands of other great lawyers, politicians and business men. YOU, too, can become a lawyer or law trained businessman through home study guided by the successful practicing lawyers of our faculty. Write today for free book.
AMERICAN CORR. SCHOOL OF LAW
3601 Michigan Ave., Dept. 135-C Chicago

YMCA TRADE SCHOOL

Learn Auto Mechanic, Auto Electrical, Battery, Machine, Electrical, Radio Mechanic, Tiling, Bricklaying, Plastering, Plumbing, Welding, Drawing, Estimating, Show Card, Sign Painting Window Dressing, Fine And Commercial Art.
Write for Catalog 50.
BROOKLYN ENGINEERING INSTITUTE
(Operated by Bedford Br. Y. M. C. A.)
1125 Bedford Ave., Brooklyn, New York City.

TRAVEL for "Uncle Sam"

New Bandit Proof Railway Mail Car

U.S. GOVERNMENT JOBS
$1140 TO $3000 YEAR

Men—Boys, 18 Up

Steady Work
Paid Vacations
Common Education
Usually Sufficient
Mail Coupon —Today
SURE

COUPON

FRANKLIN INSTITUTE
Dept. F173, Rochester, N. Y.

Gentlemen: Rush to me without charge 32-page book with list of U. S. Government big paid positions obtainable and sample coaching. Advise me regarding the salaries, hours, duties, vacation and full particulars.

Name.....

Address.....

DR. HARLAN TARBELL
MASTER OF MAGIC

I'll Teach YOU Real Professional MAGIC

at Home ~ By MAIL

Big Stage Illusions Secrets of the Orient

Master Illusions from Europe, India, China, Japan. Guarded secrets of the Orient—over 150 tricks from small effects to Big Stage Illusions, with nearly 1500 illustrations, *that* and *more* is what you get in the Tarbell Course in Magic!

Read This Great Endorsement

Dr. A. M. Wilson, Editor of the Sphinx, Official Organ of The Society of American Magicians, pays the Tarbell Course this tribute:

"The greatest work on Magic ever attempted and will mark an epoch in Magic . . . greater than the revelations of Robert Houdini, Father of Modern Magic, 60 years ago."

Money-Back Guarantee Protects YOU

The Tarbell course in Magic protects you with an Iron Clad Guarantee to refund your money if you are not satisfied. You can't lose. You have everything to gain.

The first and only **Course in Magic** ever offered to the public teaching *real professional Magic!*

Get Started on the Road to Big Money

You need not give up your job. You don't have to be a "professional" to make big money. You can make nice money entertaining on-the-side as a semi-professional, or if you want to, you can become a big Magician, make big money and enjoy fame and glory. Learn all the great limitless opportunities that are in store for *you*. Mail coupon NOW!

Mail This Coupon NOW!

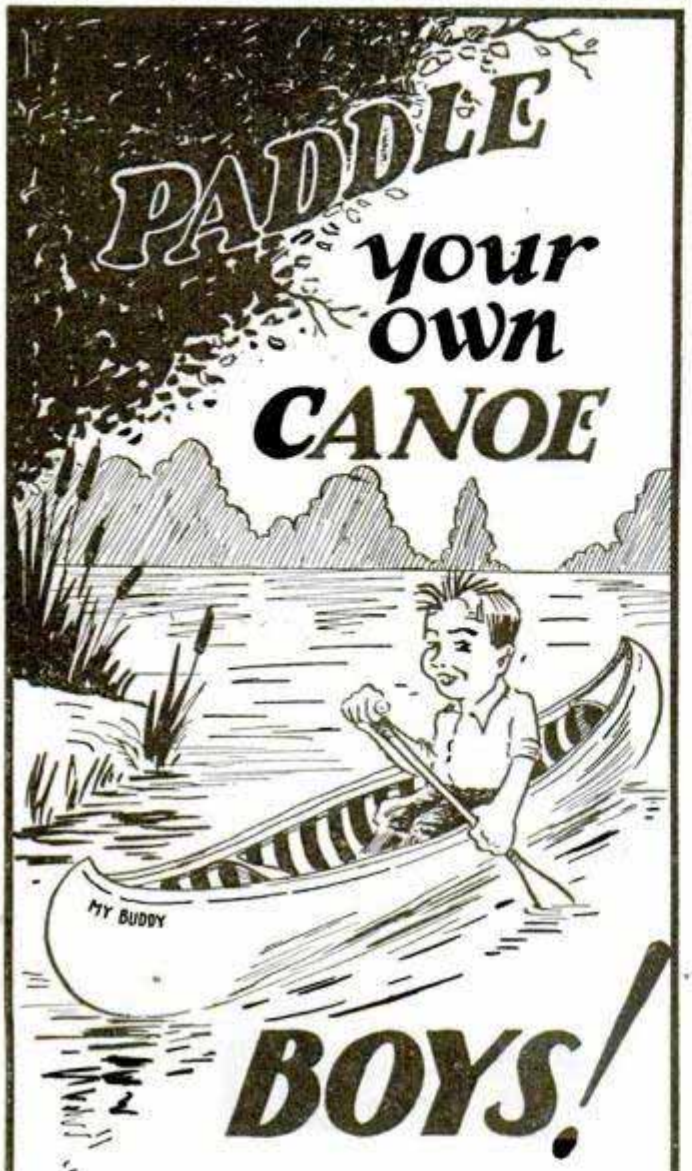
Tarbell System, Inc.
1926 Sunnyside Ave., Studio C-935 Chicago

Tell me about Dr. Tarbell's new and simple system by which I can learn the secrets of MAGIC. Also tell me about your Low Price and Easy Terms Offer. No obligation on my part.

Name.....

Address.....

..... *Age*.....



BOYS!

HOW would you like to be started for camp with your own spending money jingling in your pockets? A shiny new scout ax and knife tucked away with a new baseball bat, ball and glove. These are the kind of dandy prizes hundreds of boys are earning every week through their Crowell Junior Sales work, and besides they earn their own spending money.

Every week Crowell Junior Salesmen deliver three of the best known magazines to regular customers. It takes but a few minutes of their spare time. You can do the same by sending your name and address on the coupon. Do it now!

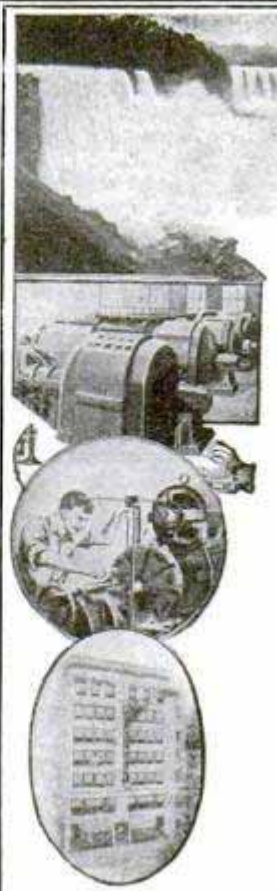
Mr. Jim Thayer, Dept. 68
The Crowell Publishing Co.,
Springfield, Ohio.

Dear Mr. Thayer: Tell me how I can earn money and prizes.

My Name.....

Address.....

Town.....State.....



LEARN
BY DOING

Every phase of all branches of

ELECTRICITY

taught by

Actual Practice

In one of America's foremost institutions for trade training

ESTABLISHED 1902

No Books Used

Individual Instruction
Start Any Day

Write for FREE 64-page catalog

THE NEW YORK ELECTRICAL SCHOOL
44 West 17th St., New York City

Learn to PAINT SIGNS and SHOW CARDS

We quickly teach you by mail, or at school, in spare time. Enormous demand. Big future. Interesting work. Oldest and foremost school.

EARN $50 TO $200 WEEKLY

John Vassos, N. Y., gets $25 for single show card. Crawford, B. C., writes: "Earned $200 while taking course." Don't delay. Send today for complete information, samples and guarantee.

DETROIT SCHOOL OF LETTERING
150 Stimson Ave. Est. 1899 DETROIT, MICH.

PIANO JAZZ

By Note or Ear. With or without music. Short Course. Adult beginners taught by mail. No teacher required. Self-instruction Course for Advanced Pianists. Learn 259 styles of Bass, 684 Syncopated Effects, Blue Harmony, Oriental, Chime, Movie and Café Jazz, Trick Endings, Clever Breaks, Space Fillers, Sax Slurs, Triple Bass, Wicked Harmony, Blue Obligato, and 247 other Subjects, including Ear Playing. 133 pages of REAL Jazz, 25,000 words. A Postal brings our FREE Special Offer.

Waterman Piano School, 1826 W. Adams St. Los Angeles, Cal.

GOV'T. POSITIONS

$35 TO $75 WEEKLY

MEN-WOMEN

( ) Ry. Mail Clerk	( ) Steno-Typist
( ) Prohibition Inv.	( ) Immigrant Inspector
( ) R. F. D. Carrier	( ) Seamstress
( ) Special Agent (investigator)	( ) Auditor
	( ) Steno-Secretary
( ) City Mail Carrier	( ) U. S. Border Patrol
( ) Meat Inspector	( ) Chauffeur-Carrier
( ) P. O. Clerk	( ) Watchman
( ) File Clerk	( ) Skilled Laborer
( ) General Clerk	( ) Postmaster
( ) Matron	( ) Typist

AGE 18 to 55

OZMENT INSTRUCTION BUREAU, 111 Arcade Bldg., St. Louis, Mo. Send me FREE particulars How To Qualify for positions marked "X". Salaries, locations, opportunities, etc. ALL SENT FREE.

NAME.....

ADDRESS.....

"LOOK.... he's imitating a pianist!"

.....someone shouted Then a queer thing happened

JACK had strummed some "Blues" for us on his uke and Nan had just finished her screamingly funny burlesque on the "Kinkajou." We were all set for dancing when—the radio refused to work!

No amount of jiggling brought it to life, either. In spite of our best efforts, all we could get from that confounded radio was such desolate howls that the girls begged us to leave the poor old thing alone.

Someone made a half-hearted suggestion of bridge. But Tom had a better plan. Pulling Joe to his feet—good old "sit-in-the-corner" Joe, whom everyone liked to pick on—he cried in a loud voice:

"Just a minute, folks! The party is saved! Joe, here, has kindly offered to enliven the proceedings with a piano solo . . ."

Loud cheering drowned out the rest. This promised to be good—for, as we all knew, Joe couldn't play a note. Naturally we expected him to clown . . .

Just as he sat down at the piano, Tom called out:

"Play 'The Varsity Drag'—that's a hot dance number!"

I couldn't help smiling at the thought of Joe—who had always taken a back seat at our parties—playing "hot" music. Excited whispers came from all parts of the room. "Wonder what he's going to do!"—"He doesn't know one note from another!" Suddenly someone shouted:

"Get this! Look—he's imitating a pianist!"

A Queer Thing Happens

Raising his hand melodramatically, Joe waited a moment to command silence.

Then, without any more preliminaries, and to the complete amazement of us all, he struck the first bars of—"The Varsity Drag!"

And how! With all the verve and expression of a professional! No wonder Tom's eyes almost popped out of his head! This wasn't the clowning he had expected Joe to do!

Unable to resist the tantalizing music, couple after couple glided around the floor. When Joe stopped playing the applause could have been heard around the block—only to be instantly followed by requests for more numbers.

All evening they kept Joe busy at the piano—playing jazz, popular songs, sentimental ballads, even classical stuff—everything the crowd asked for, and they asked for plenty!

How that lad could play! I was dumbfounded. Why, it was incredible! Joe had always seemed to be a "born wallflower"—he had never displayed any talent for entertaining—yet now . . . I determined to solve the puzzle. On the way home that night I drew Joe aside and demanded:

"How on earth did you do it?"

He laughed. "Why, it was very easy! I simply took that home-study course in music your cousin told us about . . ."

"You don't mean that course that was supposed to show you how to play without a teacher, do you?" I interrupted.

"That's it! Say, it's a great course, all right!" he enthused. "There wasn't any expensive private teacher to pay—and since the lessons came by mail, I didn't have to set aside valuable hours for study. In fact, I practiced only in my spare time, a few minutes a day. And the course is thorough! Why, almost before I knew it, I was playing simple pieces *by note*, and . . ."

"I guess you don't have to tell me how thorough it is," I broke in. "Your performance tonight was a knockout! And you used to say you had no 'talent'!"

"I haven't," he insisted. "Anybody can learn to play the U. S. School of Music way!"

* * * *

This story is typical. You, too, can learn to play your favorite instrument by this *easy* "at home" method that has taught almost half a million people. It's so simple you don't have to know the slightest thing about music. Your progress is amazingly rapid because every step is clear and easy to understand. Just pick out the instrument you want to play. The U. S. School of Music does the rest, and the cost averages just a few cents a day!

Pick Your Instrument

Piano	Violin
Organ	Clarinet
Ukulele	Flute
Cornet	Saxophone
Trombone	Harp
Piccolo	Mandolin
Guitar	'Cello

Hawaiian Steel Guitar
Sight Singing
Voice and Speech Culture
Harmony and Composition
Drums and Traps
Automatic Finger Control
Banjo (Plectrum, 5-String or Tenor)
Piano Accordion

Free Book and Demonstration Lesson

Our illustrated free book and free demonstration lesson explain all about this remarkable method. If you really want to learn to play—take this opportunity to make your dreams come true. Sign the coupon below. Instruments supplied when needed, cash or credit. U. S. School of Music, 78 Brunswick Bldg., New York.

U. S. School of Music,
78 Brunswick Bldg., New York City

Please send me your free book "Music Lessons in Your Own Home" with introduction by Dr. Frank Crane, Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course:

.....

Have you above instrument?.....

Name.....

Address.....

City..... State.....

High School Course in Two Years!

You Want to Earn Big Money!

And you will not be satisfied unless you earn steady promotion. But are you prepared for the job ahead of you? Do you measure up to the standard that insures success? For a more responsible position a fairly good education is necessary. To write a sensible business letter, to prepare estimates, to figure cost and to compute interest, you must have a certain amount of preparation. All this you must be able to do before you will earn promotion.

Many business houses hire no men whose general knowledge is not equal to a high school course. Why? Because big business refuses to burden itself with men who are barred from promotion by the lack of elementary education.

Can You Qualify for a Better Position

We have a plan whereby you can. We can give you a complete but simplified high school course in two years, giving you all the essentials that form the foundation of practical business. It will prepare you to hold your own where competition is keen and exacting. Do not doubt your ability, but make up your mind to it and you will soon have the requirements that will bring you success and big money. YOU CAN DO IT.

Let us show you how to get on the road to success. It will not cost you a single working hour. Write today. It costs you nothing but a stamp.

American School

Dept. HC-74, Drexel Ave. and 58th St., Chicago

American School

Dept. HC-74, Drexel Ave. and 58th St., Chicago

Send me full information on the subject checked and how you will help me win success.

....Architect	....Business Law
....Building Contractor	....Lawyer
....Automobile Engineer	....Machine Shop Practice
....Automobile Repairman	....Mechanical Engineer
....Civil Engineer	....Shop Superintendent
....Structural Engineer	....Employment Manager
....Business Manager	....Steam Engineer
....Cert. Public Accountant	....Foremanship
....Accountant and Auditor	....Sanitary Engineer
....Bookkeeper	....Surveyor (& Mapping)
....Draftsman and Designer	....Telephone Engineer
....Electrical Engineer	....Telegraph Engineer
....Electric Light & Power	....High School Graduate
....General Education	....Wireless Radio
....Vocational Guidance	....Undecided

Name.....

Address .....

.....

Don't Envy The Plumber
BE ONE!

$11.00-$16.00 PER DAY and work EVERY day, is the Plumber's wage.

Every skilled workman will tell you that Plumbers have the best of it. WINTER and SUMMER the Plumber is busy at top wages. No skilled Plumber is ever out of a job—compare his opportunities with any trade, plus the opportunities of having your own shop.

We teach you Plumbing with TOOLS (not books) under Licensed Master PLUMBERS in one of the finest equipped schools in America. We make you a Plumber, every branch is taught thoroughly—Lead Work—Blue Print for plan reading—all other tricks.

LEARN IN 8 to 12 WEEKS without previous experience.

If you are making less than $60.00 a week you owe it to yourself to investigate. Get FREE catalog that tells in pictures and words how we teach this trade. Special rates now.

UNIVERSAL PLUMBING SCHOOL

2030 Troost Ave. KANSAS CITY, MO.

Be a Doctor of Surgical CHIROPODY

Dignified professional field. Call for doctors everywhere. Make $5000 to $15,000 a year. Course only 2 years at best known College of Chiropody in America equips you for practice. 15th year. You are ready to enter with 4 years high school or equivalent. Largest foot clinic in world—large faculty physicians, surgeons, chiropodists—study in Chicago—you can earn while you learn. Write for catalog. No obligation. Dept. 511.

ILLINOIS COLLEGE OF CHIROPODY

1327 North Clark Street Chicago

Learn to Draw
I Teach by Mail

Begin Today—Write for My FREE Book. I can make a good penman of you at home during spare time. Write for my **FREE BOOK, "How to Become a Good Penman."** It contains specimens and tells how others mastered penmanship by the Tamblyn System. Your name will be elegantly written on a card if you enclose stamp to pay postage. Write today for book.

F.W. Tamblyn, 418 Ridge Bldg., Kansas City, U.S.A.

LAW
STUDY AT HOME

Become a lawyer. Legally trained men win high positions and big success in business and public life. Be independent. Greater opportunities now than ever before. Big corporations are headed by men with legal training. Earn

$5,000 to $10,000 Annually

We guide you step by step. You can train at home during spare time. Degree of LL.B. conferred. LaSalle students found among practicing attorneys of every state. We furnish all text material, including fourteen-volume Law Library. Low cost, easy terms. Get our valuable 108-page "Law Guide" and "Evidence" books FREE. Send for them NOW.

LaSalle Extension University, Dept. 864-L, Chicago

The World's Largest Business Training Institution

No Joke to STAMMER

Be successful. Master perfect speech. Win happiness. Send for full information and special phonograph record. Dime covers postage.

153 Stimson, The Lewis Institute, Detroit

BE AN ARTIST

WE CAN TEACH YOU DRAWING in your own home during your spare time. Twenty-five years of successful teaching proves our ability. Artists receive large salaries.

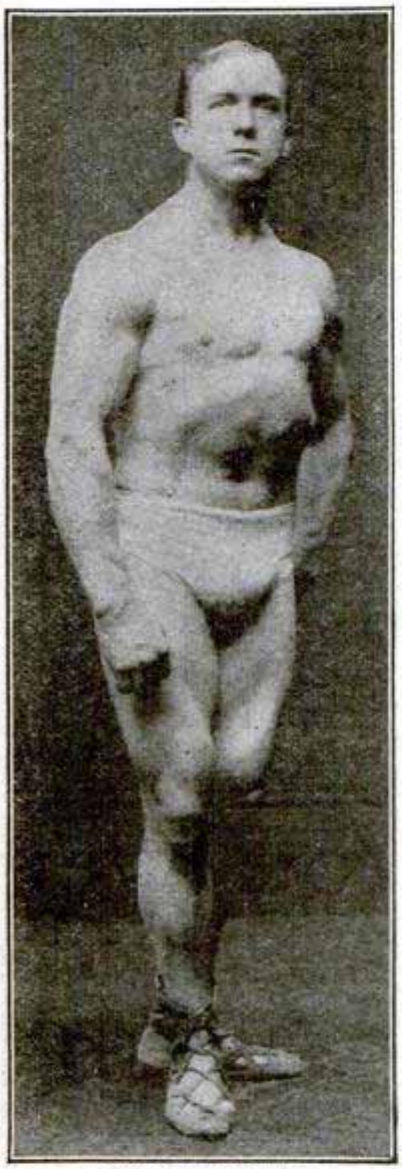
Write Today for Art Year Book

SCHOOL OF APPLIED ART

ROOM NO. 2 BATTLE CREEK MICH.

Wake Up Your Lazy Muscles!

Fill Your Body With Manly Vigor —STRONGFORT Tells How



STRONGFORT
Builder of Men

Your body is full of lazy muscles—you're asleep in most of your anatomy—you're not exerting half the power that you can arouse by stirring up those flabby worthless muscles—you haven't half the vigor and pep and stamina you could have if you sounded the alarm clock and awakened those sleepy muscles and put them to work! No, man—you, perhaps, like thousands of others, are not more than half a man—you're not a full functioning physical machine—you're not the powerful fellow you ought to be, and can be if you'll listen to me and wake up.

You Can Be Strong

You can be a man who will command the admiration of women for your physique and of men for your powerful muscular ability. You can be a man to be feared in combat—a winner in sports. I know what I am talking about—I can prove by tens of thousands of delighted pupils that my methods of body development are beyond any ordinary gymnasium or physical culture course.

It was through my experience in developing my own body to a perfect physical condition—building up a body at once **symmetrical, perfectly proportioned** and **full-functioning**—and afterwards training and conditioning boxers, wrestlers, and other athletes—and particularly in restoring thousands of weak men to vigorous health and manly strength—that I evolved the science of

STRONGFORTISM

For Building Up Bodies

STRONGFORTISM works wonders with run-down, weakly, skinny fellows. It builds them up to health through internal muscular development, then rounds them out into robust physical specimens, by bringing into play every muscle and making every muscle **do its work** as Nature intended. You'll be astonished how quickly you'll feel the benefits of this wonderful health and strength course.

You'll feel like a new man almost from the first day you start under my instructions—and you'll **look like a new man!** You'll be surprised at the lazy muscles you wake-up when you begin, and they'll wake you up in turn. You'll quickly realize that a new day has dawned for you as you feel the red blood coursing through your whole body like a bounding mountain stream. The old, stupid, sluggish feeling will disappear like magic. That gloomy outlook will vanish as though a heavenly hand had brushed it away. Oh, it's a great feeling! **Great to feel like a man!** And you surely will when you adopt Strongfort as your instructor and guide—Strongfort, "the builder of men."

Strongfortism Restores Power

by ridding the human organism of distressing ailments and irregularities that have clogged its normal action and thrown its delicate machinery out of gear. The heart, lungs, liver, stomach, brain, all act in harmony in health. Strongfortism restores this harmony; helps to create new red blood; strengthens the vital organs; brings back health, strength, vigor, vitality—the ability both to do things worth while and to enjoy to the fullest the good things of life.

I Want To Send You MY FREE BOOK

This book of many pages and dozens of pictures tells of my wonderful experience. It tells what I have done for others, what I can do for you. It doesn't mince words. It tells plain truths. "Promotion and Conservation of Health, Strength and Mental Energy," points the way from disease and weakness to health and strength. It is priceless. I'll send it to you on request—FREE. Write for your copy today.

STRONGFORT INSTITUTE
LIONEL STRONGFORT, DIRECTOR.
PHYSICAL AND HEALTH SPECIALIST
DEPT. 495 NEWARK, NEW JERSEY, U. S. A.

Send this FREE Consultation Coupon

ABSOLUTELY CONFIDENTIAL

Mr. Lionel Strongfort, Strongfort Institute, Dept. 495, Newark, N. J.—Please send me absolutely free my copy of your book, **"PROMOTION AND CONSERVATION OF HEALTH, STRENGTH AND MENTAL ENERGY."** I am enclosing 10c (one dime) to help cover mailing expense, etc., and have marked (X) before the subjects in which I am most interested.

..Catarrh	..Overweight	..Weak Heart
..Colds	..Constipation	..Great Strength
..Asthma	..Weak Back	..Lung Troubles
..Headache	..Weak Eyes	..Round Shoulders
..Rupture	..Rheumatism	..Stomach Disorders
..Thinness	..Nervousness	..Increased Height
..Pimples	..Short Breath	..Muscular Development
..Insomnia		

Other Ailments.....

Name.....

Age.....Occupation.....

Street.....

City.....State.....

Follow this Man

Secret Service Operator 38 is on the job

FOLLOW him through all the excitement of his chase of the counterfeit gang. See how a crafty operator works. Telltale finger prints on the lamp stand in the murdered girl's room! The operator's cigarette case is handled by the unsuspecting gangster, and a great mystery is solved. Better than fiction. It's true, every word of it. No obligation. Just send the coupon and get—

FREE!

The Confidential Reports No. 38 Made to His Chief

And the best part of it all is this. It may open your eyes to the great future for YOU as a highly paid Finger Print Expert. More men are needed right now. This school has taken men just like you and trained them for high official positions. This is the kind of work you would like. Days full of excitement. Big salaries. Rewards.

Can you meet this test?

Can you read and write? Are you ambitious? Would you give 30 minutes a day of your spare time preparing yourself for this profession? Would you like a life of excitement, thrilling adventures and high pay? Answer "yes" and I'll show you how to attain all this.

Send the coupon and I'll send the Free Reports—also a wonderful illustrated book telling of the future awaiting you as a Finger Print Expert.

T. G. COOKE, Pres.

UNIVERSITY OF APPLIED SCIENCE

1920 Sunnyside Ave., Dept. C-135 Chicago, Ill.

University of Applied Science
1920 Sunnyside Ave., Dept. C-135. Chicago, Ill.

Gentlemen:—Without any obligation whatever, send me the Reports of Operator No. 38, also your illustrated Free Book on Finger Prints and your low prices and Easy Terms Offer.

Name .....

Address .....

..... *Age* .....

Play Piano BY EAR —IN 90 DAYS!

Play anything—jazz to classical! Even if you know **nothing** about piano music—I'll have your fingers dancing over the keyboard **with confidence** in 90 days. If you can hum or whistle a tune **you can play it!** My students are broadcasting—making money. **MAKE ME PROVE IT!** Without puzzling notes! Without practicing tedious scales! I've found the way to bring out your musical instinct. New and original system does away with years of work. **YOU WANT THE PROOF!** I'll send it. Write me now.

D. M. SUTTLE, Director
ILLINOIS SCHOOL OF MUSIC
515 Hunter Bldg., Chicago, Ill.

Send NOW for PROOF!

LEARN MECHANICAL DENTISTRY

making crowns, plates, bridges, etc. for dentists. Unusual demand now and always will be—a human necessity. Steady, dignified Professional Trade. Three to six months training. Easily learned by actual practice. **R.R. Fare to nearest school included.** Part time positions to help pay expenses while training.

Ask for Catalog No. 2.

BODEE DENTAL INSTITUTE

New York 1755 Broadway
Philadelphia 1305 North Broad Street
Brooklyn 85 Court Street

LEARN TO Mount Birds

We teach you **At Home by Mail** to mount *Birds, Animals, Heads, Tan Furs and Make Rugs.* Be a taxidermy artist. Easily, quickly learned by men, women and boys. Tremendously interesting and fascinating. Decorate home and den with beautiful art. *Make Big Profits from Spare Time Selling Specimens and Mounting for Others.*

Free Book—Yes absolutely **Free**—beautiful book telling all about how to learn taxidermy. Send **Today.** You will be delighted. **Don't Delay!**

Northwestern School of Taxidermy C337 Elwood Bldg. OMAHA, NEB.

Are You Ever Ashamed of Your English?

DO YOU say "who" when you should say "whom"? Do you say "between you and I" instead of "between you and me"? Do you mispronounce common words in your speech or use them incorrectly when you write?

You do not need to make these mistakes any longer. Right at home, in the privacy of your own room, you can make up the education you missed in the days when you should be at school.

The International School of English will teach you, just as it has taught thousands of other men and women, by a simple new method which shows you instinctively which word to use and how to use it. *Mail coupon for Free Booklet.*

INTERNATIONAL SCHOOL OF ENGLISH
Division of the International Correspondence Schools
Box 5553-F, Scranton, Penna.

Without cost or obligation, please send me complete details of your home-study course in:

☐ GOOD ENGLISH

☐ Advertising ☐ Accounting
☐ Salesmanship ☐ High School Subjects
☐ Bookkeeping ☐ Civil Service

Name.....

Address.....

Be a Draftsman

Start Today **Get this Draftsman's Rule FREE**

If you are 16 or older and will copy jack shown at right and mail it to me I will send you a Draftsman's pocket rule, free.

Copy This Jack and Get Draftsmen's Rule FREE!

Copy me and get Draftsman's Pocket Rule free—*Jack*

New Pay-Raising Plan

Now is the time to learn to be a draftsman and Get Free, "My Pay-Raising Plan." Send for it at once. Let me tell you how some Dobe Draftsmen make $250.00 to $750.00 a month. Read this advertisement clear through. See for yourself how you can make real money as a draftsman. Read how much work there is for them.

See FREE Draftsman's Rule offer, just for copying a Jack so I will have some idea what kind of a draftsman you would make.

Draftsmen Needed In—

Auto Work
The automobile industry is one of the greatest in America. Thousands of draftsmen needed. I'll train you for the work.

Electricity
Electricity is the coming motive force of the world. Draftsmen are needed in every department of this fascinating work. I'll train you at home. Get a job here.

Aviation
Aviation is just in its infancy. It is bound to expand to enormous proportions. Draftsmen are essential to it. I'll train you quick at home for drafting position.

Motor Bus Work
Motor bus building and motor bus transportation have become leading world industries. Hundreds of draftsmen engaged in this work. I'll show you the way.

Building Work
There will always be building. No structure can be erected without plans drawn by draftsmen. I'll make you an architectural draftsman at home.

← FREE "My Pay-Raising Plan"

Earn While You Learn

You can start earning extra money a few weeks after beginning my training. I give you special work and tell you how to make money.

Money Back If Not Satisfied

What could be fairer than that? I don't ask you to take any chances. I train you under a positive Money Back Agreement. If my training does not satisfy you after you have finished you get every penny back.

Age or Lack of Education No Drawback

You do not need previous experience. You do not need to be a high school graduate. My practical, home study course gives you just the kind of training you need to become successful. Your spare time is all that is necessary.

Employment Service

After training you I help you to get a job, without charging you a cent for this service. Employers of draftsmen come to me for men because they know that men I train make good.

I Train You at Home New, Quick, Sure Way

My practical working method makes every step in learning drafting, as clear as a moving picture. That's why I train you so fast to be a draftsman.

You get this set of Imported Drafting Tools FREE of all extra expense just as soon as you become my student.

"I will train you at home."—Engineer Dobe

If You Earn Less Than $70 a Week Write Me Today!

ACT NOW Before You Put this Magazine Down, Let me send you my books "Successful Draftsmanship" and "My Pay Raising Plan". Remember Draftsmen are needed everywhere. That's the kind of profession to get into. Get started now. Get into a better position, paying a good straight salary the year around.

Engineer Dobe 1951 Lawrence Avenue Div. C-135 Chicago, Ill.

FREE RULE COUPON!

ENGINEER DOBE
1951 Lawrence Ave., Div. C-135 Chicago

Here's the sketch. Send me free rule; also send me free of all cost books "Successful Draftsmanship" and "My Pay-Raising Plan"—how to earn money while learning and proof of big money paying positions.

*Name*_____ *Age*_____

*Address*_____

*Post Office*_____ *State*_____

You can play the HAWAIIAN GUITAR Just like the Hawaiians!

Play all the latest hits just as the Hawaiians do. Be the most popular member of your set, a happy crowd always around you, everybody enjoying and admiring your playing. Get in on all the good times. Entertain your friends—or play professionally. We will help you.

Native Hawaiian expert directs you

You get expert instruction, directed by a world-famous player and teacher, Prof. Walter Kolomoku. He quickly reveals to you the secrets of this fascinating instrument.

Complete Conservatory Course

You get 52 complete printed lessons. Nothing is omitted. **Pictures explain** every **move.** And no matter how little you know about music when you begin, no matter if you have never touched a musical instrument, you can positively learn to play by our plain, easy picture method. You are sure to learn! What we can do for others we can do for you. 51,000 successful students. This record assures your success.

Learn at home in spare time

Study in spare time—in absolute privacy— *when* you like—*as long* as you like. Even if you don't know one note from another, our method is so simple you begin a piece your first lesson. In half an hour you can play it!

Only 4 motions to learn

Then you can play any music—popular songs, classical, old-time melodies, native Hawaiian airs—or real jazz—separately or with accompaniment. You'll never be lonesome after you learn to play on this beautiful Hawaiian Guitar.

GIVEN when you enroll— $18 to $20 Hawaiian Guitar

With Genuine Seal Grain Fabrikoid Cover and Complete Playing Outfit

Reliable retailers ask $18 to $20 for a similar instrument and outfit without the fine Fabrikoid Case, *which alone is valued at $3.50.* Yet you receive this sweet-toned splendidly built **Hawaiian Guitar, case and entire playing outfit,** including picks, steel playing bar, tuning pipe, etc., without one penny of expense, as soon as you enroll.

Pay as you play

We make it easy for you. Start any time with a small first payment—then pay while learning. It comes to only a few cents per lesson. And bear in mind: Your only investment is the cost of the course—we furnish everything else.

FREE Our new illustrated book, "*The Romance and Enchantment of Hawaii—Its Music and Its People.*" A book you will want to keep. You won't lay it down until you have read it from cover to cover. Send for your copy today.

OTHER COURSES Tenor Banjo, Violin, Tiple, Tenor Guitar, Ukulele, Banjo Ukulele—well-known instructors.

FIRST HAWAIIAN CONSERVATORY of MUSIC, Inc.
9th Floor Woolworth Bldg.
Dept. 548, New York, N. Y.
Approved as a Correspondence School Under the Laws of the State of New York.
Member of National Home Study Council.

Send This Coupon for Liberal Offer!

FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.
9th Fl., Woolworth Bldg., Dept. 548, New York, N. Y.

Please send full information about your 52-lesson **Hawaiian Guitar Course.** I am not obligated to enroll unless I want to.

Name_____

Address_____

City_____ State_____

PREPARE FOR AN

ART CAREER

—thru the only art school operated as a department of a large art organization, who have actually produced over a quarter million drawings for leading advertisers. Where else can you get so wide an experience? Home study instruction. Write for illustrated book telling of our successful students.

MEYER BOTH COMPANY
Michigan Ave. at 20th St. Dept. 16, Chicago, Ill.

Learn Advertising at HOME

Send your name and address for free booklet giving interesting information and vital facts about Advertising. Find out how we prepare you at home, in your spare time, for the opportunities open in this fascinating business. Practical work. No text books. Old established school. Successful graduates everywhere. Just the plan you have always wanted. Write today. No obligation.

PAGE-DAVIS SCHOOL OF ADVERTISING
Dept. 135-C, 3601 Michigan Ave. Chicago, U. S. A.

WANTED!

Ornamental Iron and Bronze Draftsmen. $50.00 to $65 a week to trained men—up to $500.00 a month to experienced men. We train you at home and help place you when ready. Demand greater than supply. Get out of the rut—write today for full information and booklet "Knowledge—Your Greatest Asset."

American Institute of Ornamental Iron & Bronze
3069 Hennepin Avenue, Minneapolis, Minn.

Be An Auto Expert!

LEARN IN LOS ANGELES

Be an auto expert! Earn $40 and more every week. If you are earning less, stop wasting your life away. The auto industry will pay you more and offer you greater opportunity. You can qualify for big-pay auto jobs through National's famous job-experience training method. Over 17,000 successful graduates have proved its genuine efficiency. You learn auto mechanics, ignition, repairs, construction, etc., by actual practice. You are definitely certain to qualify. Life scholarship. No age limit. Million-dollar training institution. Est. 1905. Free employment service. Write for free illustrated auto book—Explains everything. **FREE BOOK**

NATIONAL AUTOMOTIVE SCHOOL

Dept. 714 4006 Figueroa St., Los Angeles, Calif.

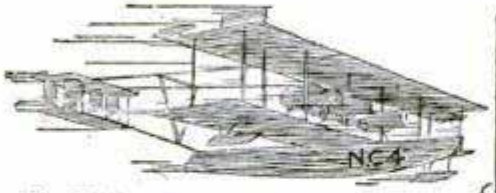
Send me the big, FREE National Auto Book that explains how I can get a big pay auto job.

Name_____

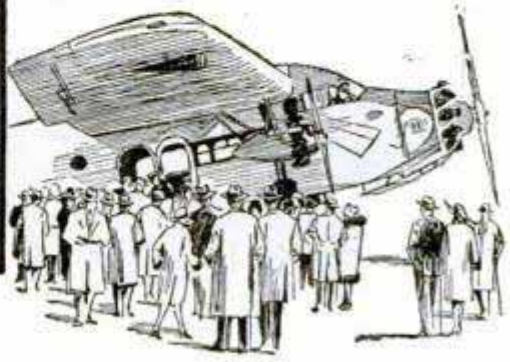
Address_____

City_____ State_____

Nine Years Ago this Man Piloted the First Plane Across the Atlantic



The NC-4 — first plane to cross the Atlantic, piloted by Lieut. Walter Hinton. Left Trepassey Bay, Newfoundland, and arrived Lisbon, Portugal; May, 1919.



Walter Hinton

was pilot of the NC-4, *first* plane to successfully cross the Atlantic. He was the *first* man to fly from North to South America. He is the *first and only* world-famous flyer to give home-study students the benefit of his experience. During the War he was a crack flying instructor for the Navy. He knows how to *teach* men the *practical* way. He gives you your foundation for real success and a real future in Aviation. Get his Free Book—TODAY.

Do You Know . . .

that America already has *over 1,000* airports and landing fields in active operation? *83 concerns* are manufacturing planes. A combination airline-railway transcontinental service will begin shortly. Big plans for regular trans-Atlantic passenger lines are being completed. Planes many times larger than any ever seen are under construction right now. Trained Men are needed to operate, service and sell. The Industry of the Century is *just beginning!* Get ahead in Aviation before Aviation gets ahead of you!

Today 400,000 Miles of Flight are Behind the Training He Offers YOU

LIEUT. WALTER HINTON—first trans-Atlantic pilot of them all—is ready to train YOU for Aviation. He is ready to give you the benefit of his years of flying experience—more than 400,000 miles of flight, over land and sea, over jungle and civilization. He is ready to give you the benefit of his *proved* ability to fit men for Aviation—proved in War days when the U. S. Navy chose him for one of its crack instructors, proved today when his students are stepping into important jobs and important futures in the Industry. He will give *you* your Ground-work—*right at home*—for a real job in the air or on the ground.

He teaches you every inch of a plane. He shows you exactly *how* each part works, and *why* it works. In clear, simple language and hundreds of photographs he gives you a brass tacks knowledge of motors, plane design and construction, instruments, theory of flight—everything. He shows you *where* and *how* to get into the Industry. You get the *right* facts and *all* the facts about Aviation Today—in practical form that you can turn into CASH!

Hinton's Free Book brings you full details on how to get into Aviation and how to put yourself in line for its richest, biggest opportunities. Use the coupon—NOW!

Hinton's FREE Book Shows You How

This book is showing keen men how to *learn* Aviation—how to *train* themselves for its best jobs—how to *cash-in* on today's greatest opportunity. Whether you want to fly or want one of the *more than 40* Big-Pay jobs on the ground, get the Facts First. Hinton's book brings them. The coupon brings your copy. Mail it NOW!

Aviation Institute of U. S. A.
Walter Hinton, *Pres.*
1115 Conn. Avenue, Washington, D. C.

"I gave a brief outline of your Course to one of Ford's pilots, flying a Cleveland-Detroit plane. He told me to 'stick to it' as I am on the right track." J. Masek, 3561 E. 106th St., Cleveland, Ohio.

"Without your Course and the help of your Employment Dept. I would not have become Sales Manager of this company in the short time I have been in Aviation. I heartily recommend your training." R. N. Dobbins, Mt. Vernon Airways, Alexandria, Va.

Rush to Washington!

Walter Hinton, Pres.,
Aviation Institute of U.S.A., 1-H
1115 Conn. Av., Washington, D. C.

Dear Lieut. Hinton: Send me your Free Book. Tell me how I can train under you, right at home, for a real place in Aviation.

Name.....

Street.....Age.....

City.....State.....

O. C. MILLER
Director Extension Work
American School

3 Drafting

to prove you can

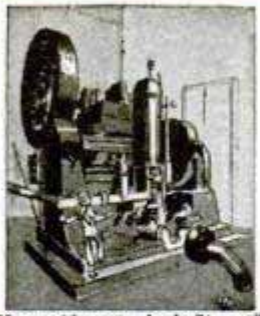
We have invented a new, simplified way to teach Drafting—the first real improvement in Drafting home instruction in history. We want you to see a few of these new Job-lessons, try them, test your own ability to master them—without one penny of cost or obligation. For instance, you will see how we get away from the "copying" methods used in the past, so you develop into a DRAFTSMAN, instead of a "tracer." See for yourself the ingenious new method which compels you to think, to solve problems, to do actual Drafting-room jobs from the very first lesson!

A New, Rapid, Simplified Training

Copying drafting lessons prepares you to be only a "tracer." This new "Job-Method" gives you actual drafting-room jobs in a new one-step-at-a-time way. With pictures which you can understand almost without reading the "lessons." And that is why the American School-trained Draftsmen can qualify for a good job at big pay when they graduate.

The American School

A two million Dollar *No-Profit* Educational Institution, now offers men a *double* service—training for a specific job, then help in finding the job. For one small price, on terms of only $6.00 a month, you are now assured of definite benefits, both in position and salary. Write for complete information—*today!*



No machine can be built until the Draftsman first builds it ON PAPER. This training prepares you for this work.

Never has the world seen anything like the building boom of today. This has created enormous demand for real Draftsmen.

5 BIG-PAY Branches

The big money in Drafting goes to men who specialize in Machine Design, or Electrical Drafting, or Architectural Drafting, or Structural, or Automotive. It is not enough merely to know *general* Drafting practice. You must know how to calculate and design and plan original work. You need many Engineering subjects to fill the kind of a Drafting position that pays $40 to $100.00 a week. The American School *now includes this specialized training in its Drafting course.*

Win Success Thru Drafting

Drafting is easy, fascinating work. Short hours. Big pay. And the Draftsman is always in line for promotion to executive positions. This training is *complete.* It includes high school subjects (if you need them) and all the Engineering and Mathematics Drafting experts require.

FREE Job Service!

The American School now offers its students and graduates, without cost, the services of an efficient employment department keeping in constant touch with employers of Draftsmen all over the U. S. We have placed hundreds of men in good, big-pay Drafting positions. We've made this training so complete, so practical, so easy to master, that our students **are bound to make good.** And so, because the demand for real Draftsmen continues to exceed the supply and because this training actually prepares men for good Drafting positions **we back it with a Free Employment Service.**

The American School

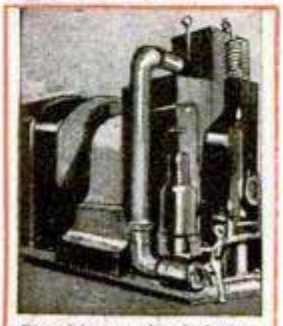
Dept. DC-74
Drexel Avenue and
58th St., CHICAGO

Lessons Actually FREE

learn at home in spare time!

Draftsmen Wanted!
$40 to $100 a Week!

70,000 fine jobs advertised last year. Get ready to fill one. Get out of the rut. Make something of yourself. Plan your future in Drafting. Even if you have only common schooling, even if you know nothing of Drafting, we guarantee to make you a real Draftsman *or to refund your money!*
Coupon brings complete information.



Electricity needs draftsmen who know Electrical principles as well as general Drafting practice. I give you this training.

The demand for Draftsmen experienced in concrete and structural steel work is enormous. Many big-pay positions open.

Every great Auto factory employs Draftsmen who specialize in Automotive work—men who design bodies, plan engines, etc.

I Will Make This Contract With You

American School
—the two Million Dollar Educational Institution

WHEN you enroll for our home-training in Drafting, we agree to give you:

1. Complete Drafting training, by the new Practice-Method.
2. **We will help you get a good Drafting position** at a substantial increase in pay,
3. **or we'll refund every cent of your money.**

O. C. Miller
Director Extension Work

Coupon Brings 3 Lessons FREE!

Get them. Test your own ability to learn Drafting and get ready for a fine job and big pay. Coupon also brings complete information about your opportunities for success in Drafting. *Mail It Today!*

Read These Letters!

City of Chicago
Department of Buildings

Gentlemen: The same day I received my diploma I got word that I was one of the two candidates who had successfully passed the examination for Deputy Commissioner of Buildings of the City of Chicago, a position paying $3600 per year.

There were eight applicants examined besides myself, all men well known to the architectural and engineering profession. Seven of these failed to obtain a passing grade of 70%. My grade was 84.69.

Inasmuch as I failed to pass this same examination three years before, my present success is mainly due to the knowledge gained through your School.

Yours very truly,
ROBERT KNIGHT

Liberty
High School
Bethlehem, Pa.

Dear Sirs:—This is to thank the American School for all that you have done for me since I signed up for the Drafting and Design Course.

In the eight years since then, I have gradually climbed from the position of tracer to that of Head of the Department of Machine Drawing and Design in our magnificent new $2,000,000 High School here, at many times the salary which I received at that time.

The officials of the Pennsylvania State Department, and Dr. Wm. C. Ash of the University of Pennsylvania, all claim that our Course in Drafting and Design is the best now being taught in this state. Every drafting graduate that we have turned out has proved successful, and one is now Chief Draftsman in a local steel concern. Yours sincerely,

J. S. LEAR

Got His Draftsman's Job

"I wanted to let you know how I came out in getting that job at the Brownell Co., Dayton, Ohio. I was to start and have a trial at Drawing, and I am still in the Drawing room. The engineer seems to like the work I make, and also the other draftsmen. I thank the school very much for getting me in at this place, because your letter of recommendation helped me a whole lot to get the job."

BERNARD WEBER,
730 St. Nicholas Ave., Dayton, O.

Has Charge of Large Jobs

"Even before I had finished my course, I was put in charge of large construction jobs in different cities. I have been doing that ever since, and the jobs are getting larger all the time. I owe my success to the American School because of the knowledge I gained in mathematics and calculations."

ELMER L. LAMB,
1305 Smith St., Peoria, Ill.

3 Drafting Lessons Actually FREE

O. C. MILLER, Director Extension Work
AMERICAN SCHOOL
Dept. DC-74, Drexel Ave. and 58th St., Chicago.

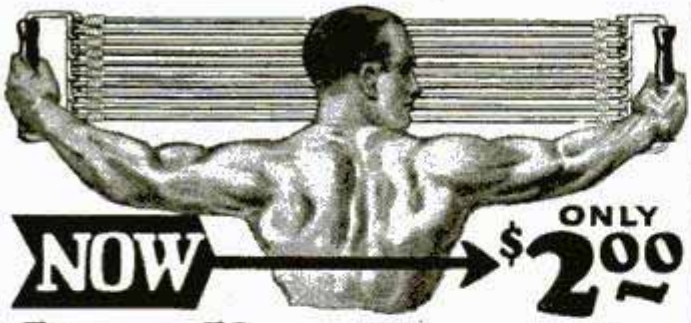
Rush 3 Free Drafting Lessons, Job and Raise Offer, complete information, money-back guarantee, etc., to prove I can become a real Draftsman at home in spare time.

Name.....

Street No.....

City.....State.....

Age.....Occupation.....

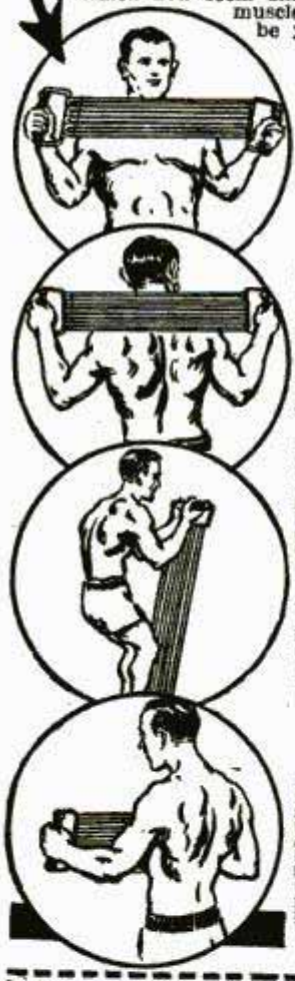


NOW ONLY $2.00

Giant Chest Expander and Progressive Exerciser

Be a muscular marvel. Have the muscles of a superman. Become strong for your health's sake or to astound your friends with extraordinary feats which only men of giant strength can do. In a few short weeks you will easily do stunts which now seem difficult—then real muscles and strength will be yours—and yours to keep. If you want exercise to just keep in good shape you can reduce the strength of the Progressive Exerciser by eliminating as many cables as you wish. If you want great resistance so as to build up big solid muscles then use the full strength.

Send No Money Use This Money Saving Coupon



How the Giant Chest Expander and Progressive Exerciser Is Made

The Giant Chest Expander and Progressive Exerciser is made with new live, springy rubber so as to give it long wearing and great resisting qualities. Do not pay more for an exerciser that has forty or less rubber strands to each cable. Get the best and most durable. The Giant Progressive Exerciser has **50 strands** of the finest rubber procurable to each cable.

Free Instructions

We do not think it enough to send you an exerciser worth double what we ask, so for a limited time, we will also include instructions absolutely free. These instructions are interesting and simple to follow—they show you the short cut to health and strength. Order today before this wonderful offer is withdrawn.

Your Guarantee

The Giant Chest Expander is sold with a guarantee that you will say it is the finest you ever saw or your money back.

5 Cables for $2 or double strength **10 Cables for $4**

The double strength exerciser has resistance of over 200 lbs.

How to Order—Send No Money

Sign your name and address to coupon below and get your Giant Exerciser at the present low introductory price by return mail. The price is made low because we want everyone to enjoy muscles and strength at the lowest possible cost. Don't pay more—order from us—get the most for your money. Use coupon now.

PROGRESSIVE EXERCISER CO.,
4008 Langdon Bldg.,
Broadway and Duane Street, New York

Please send ☐ Your 10 cable Progressive.
☐ Your 5 cable Exerciser.

Check the Exerciser you want, and it will be sent you by return mail. Pay postman introductory price, plus few cents postage on arrival. It is understood that if you are not entirely satisfied with your exerciser you may return it within 5 days and get your money back.

Name.....

Street.....

City.....State.....

If you live outside the United States, send cash with order.

Complete training in AVIATION

WITH

New American Eagles

The Porterfield Flying School is operated under the management of the American Eagle Aircraft Corporation, Kansas City, Mo., the third largest aircraft factory in the United States.

Unlimited opportunities in all departments of Aviation are waiting for properly trained men. More than one hundred airplane factories are turning out thousands of planes. The American Eagle Company alone is now producing ten ships per week. It is impossible to keep up with the tremendous demand for aircraft. Only the great shortage of pilots, airplane riggers, mechanics and builders is holding up the faster development of Aviation.

Porterfield graduates have fine opportunities to accept big paying jobs with new American Eagle distributors and dealers that are being appointed every week all over the country. All instructors are army trained licensed transport pilots. Your individual training is on modern equipment and government approved American Eagle airplanes.

Send for illustrated catalog describing complete ground school and flying course. State age and occupation.

PORTERFIELD FLYING SCHOOL, Inc.
Dept. 1017, 2800 E. 13th St., Kansas City, Mo.

LAW Free Book

Write today for FREE 96-page book, **"THE LAW-TRAINED MAN"**, which shows how to learn law in spare time through the Blackstone home-study course prepared by 80 prominent legal authorities, including law school deans, and U. S. Supreme Court justices. Combination text and case method of instruction used. All material necessary furnished with the course, including elaborate 25-volume law library, delivered immediately upon enrollment. Many successful attorneys among our graduates. LL. B. degree conferred. Moderate tuition, low monthly terms. Money-Back Agreement.

Write for free book today.

BLACKSTONE INSTITUTE, 307 N. Michigan Ave. Dept. 50-C Chicago

You can make BIG MONEY with this line

You can make $20.00 a day and up, starting at once, taking orders for Goodwear Guaranteed All Wool Clothes made to measure for only $23.50. Experience unnecessary. We train and equip you with powerful $20.00 outfit and supply valuable advertising and selling book that tells you exactly what to do to make the big money. Write at once for full facts about opportunity offered you in this pleasant and tremendously profitable business. Address

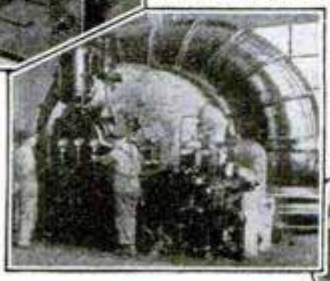
GOODWEAR, Inc.
Dept. 621, 844 West Adams Street, Chicago

ELECTRICITY — PAYS BIG!

LEARN IN 90 DAYS
ON ACTUAL MACHINERY—NO BOOKS
I'LL PAY YOUR R·R· FARE TO CLEVELAND

Don't let the world bluff you. Get into electricity—earn $50.00 to $150.00 a week—and hold your head as high as the next man. You can do it easily by coming to my famous electrical school. In 12 short weeks you'll pack in many years of practical knowledge. You work shoulder to shoulder with expert instructors on full-sized, moving, whirling motors, generators, batteries, switchboards, telephone and telegraph systems, etc., etc. McSweeny trained men get the biggest paying jobs. Every day I receive requests for graduates.

IT'S EASY THIS WAY
Fascinating, practical shop work in my big school fits you. Not a correspondence course.



No Education or Experience Needed
No books to read. No dry lectures to listen to. You learn by doing. I don't care if you can't tell a motor from a horse-and-buggy now. When you graduate I guarantee that you'll know electricity from "A" to "Z." If you're not fitted to fill a big-pay job I'll refund every penny of your tuition.

Employment Department Helps You!
I help my students find spare time jobs while they attend schools—and my Employment Department assists my graduates to locate good positions after graduation. McSweeny trained men are in demand.

Big Illustrated Book Sent FREE
Today, right now, take the first step out of that low pay rut. Mail the coupon to me for big, illustrated book on ELECTRICITY. Act to-day. Get my special Railroad Fare offer and Remarkable Tuition offer.

Just Mail Coupon!

Earn While You Learn!

McSWEENY ELECTRICAL SCHOOL
Dept. 51-K Cleveland, Ohio

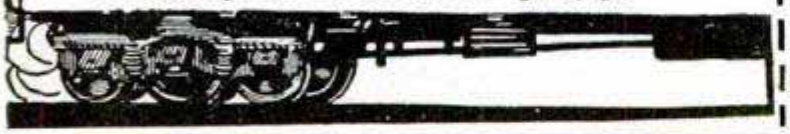
J. H. McSweeny, Pres.
McSweeny Electrical Schools,
Dept. 51-K, Cleveland, O.
Dear Mac.: Without obligation send me a copy of your big book on ELECTRICITY; also Railroad Fare offer, and details of Employment Service.
Name.....
Address.....
Town.....State.....

TRAVEL - for 'UNCLE SAM'

RAILWAY POSTAL CLERKS
MAIL CARRIERS—POSTOFFICE CLERKS
$1700 to $3300 a Year for Life

No "lay-offs" because of strikes, poor business, etc.—sure pay—rapid advancement. City and country residents stand same chance. Common sense education usually sufficient.

STEADY WORK
Cut coupon and mail it before turning the page.



MEN—BOYS 18 to 45
Use Coupon Before You Lose It

COUPON
FRANKLIN INSTITUTE, Dept. F-177, Rochester, N. Y.
Rush to me, entirely free of charge, (1) A full description of the position checked below; (2) 32-page book, with list of positions obtainable and sample coaching; (3) Particulars telling how to get the position checked.

☐ Railway Postal Clerk ($1900 to $2700) ☐ General Clerk ($1140 to $1860)
☐ Postoffice Clerk ($1700 to $2300) ☐ Prohibition Agent ($1860 to $3000)
☐ City Mail Carrier ($1700 to $2100) ☐ Rural Mail Carrier ($2100 to $3300)

Name .....
Address.....

There is no mystery about
CARTOONING

MANY famous artists and cartoonists of this country are making thousands of dollars yearly from their pens.

They earned their success through years of work and tedious search for "the right way."

Today, the courses in Cartooning and Illustrating of the International School of Art, by showing you the short cuts, will save you years of work and bring success much sooner than if you stumble along alone.

These courses will not only teach you how to draw, but will also develop your originality. They are acknowledged to be among the best and *most modern* courses in Cartooning and Illustrating offered today.

Mail Coupon for Free Booklet

INTERNATIONAL SCHOOL OF ART
International Correspondence Schools, Division of the 5555-F, Scranton, Penna.
Please send me—free—your Illustrated booklet which tells how I can succeed as a Cartoonist or Illustrator.
Name.....
Address.....

With Violet Ray Vibration Ozone Medical Electricity

The Four Greatest Curative Powers Generated by This

Great New Invention!

Elco Health Generators at last are ready for you! If you want more health—greater power to enjoy the pleasures and delights about you, or if more beauty is your desire—*write!* Ask for the book on these inventions which has just been prepared. It will be sent to you without cost. It tells you how Elco Health Generators aid you in leaving the lethargy and hopelessness of bad health and weakness behind forever. Re-vitalise yourself. Bring back energy. Be wholly alive. Write today!

Here's What Elco Users Say—

"Wouldn't take $1000 for my Elco." "Has done me more good in 2 weeks than doctors did in three years." "Cured my Rheumatism." "My Eczema gone." "Cured my stomach trouble." "Cured my weakness." "Now I sleep soundly all night." "Thanks to Elco my strength and vigor are back." "No more pain." "Colds never bother me now." "Chronic Constipation banished."

Elco Electric Health Generators

These great new inventions generate Violet Ray, Vibration, Electricity and Ozone—combined or separate. They operate on the electric light in your home or on their own motive power at less than 50 cents per year. Elco Health Generators are positively the only instruments which can give you in one outfit Electricity, Violet Ray—Vibration and Ozone—the four greatest curative agents. Send the coupon below. Get the Free Book NOW!

Free Trial

MAIL COUPON for FREE BOOK

Do not put this paper down without sending the coupon. Don't go on as you are with pains and with almost no life and energy. You owe it to yourself to be a better man or woman. You were put here to enjoy life—not just to drag through it. So do not rest another day until you have put your name on the coupon here. That will bring the whole story of these great new inventions. Do it today—now.

Lindstrom & Company

30 West Lake St. Dept. C-135 Chicago

Please send me your free book, "Health—Power—Beauty" and full information of your 10-day Free Trial Offer.

Name.....

Address.....

NOW! Complete Home Study Course

Aviation

..at New Low Price

Quickly Train at Home for BIG PAY

If you want thrills, adventure, fame, popularity—get into Aviation. Now—for first time—a complete, practical EASY-TO-GRASP Course in Aviation fundamentals offered at a low price. We teach you—by Home Study—in the quickest possible time very step necessary to become a Pilot, Instructor, Designer, Motor Expert, Inspector, Mechanician, etc.

You are taught every branch of Aviation: Motors, Wings, Assembly, Construction, Design Drawings, Nomenclature, Flight Principles, Air Rules, Meteorology, Navigation, How to Handle Ship in Air and on ground and 100 other fascinating subjects. Profusely illustrated with all necessary diagrams, charts, plans, etc. Endorsed by Aviation experts. Accredited Diploma on graduation.

All over America manufacturing, transport, air-port service and sales organizations are springing up—with valuable openings for high priced, skilled men. FREE Employment Service.

Write today for your FREE copy of "Aviation" telling quickest, least expensive way to get into Aviation.

NATIONAL AVIATION TRAINING

1031 So. Broadway, Dept. 11, Los Angeles, Cal.

"BECOME A LIGHTNING TRICK CARTOONIST"

Send $1.00 for Laugh Producing Program of 23 Trick Drawings with Instructions. Catalog of Chalk Talk Supplies Free.
BALDA ART SERVICE, Dept. 1, Oshkosh, Wis.

BASHFUL?

"Shame on you!" Are you *nervous, embarrassed* in company of the other sex? Stop being *shy* of strangers. Conquer the terrible *fear* of your superiors. **Be cheerful and confident of your future!** Your faults easily overcome so you can enjoy life to the fullest. **Send 25c for for this amazing book.**
RICHARD BLACKSTONE, B-478 FLATIRON BLDG., NEW YORK

Stop Using a Truss

STUART'S ADHESIF PLAPAO-PADS are **entirely different from trusses**—being mechanico-chemico applicators made self-adhesive purposely to keep the muscle-tonic "PLAPAO" continuously applied to the affected parts, and to minimize painful friction and danger of slipping.

No straps, buckles or springs attached.

Soft as velvet—easy to apply—inexpensive.

For almost a quarter of a century satisfied thousands report success without delay from work. Stacks of sworn statements on file. Process of recovery natural, so no subsequent use for a truss. Awarded Gold Medal and Grand Prix. Trial of "PLAPAO" will be sent you absolutely **FREE** No charge for it now or ever. Write name on coupon and send **TODAY.**

PLAPAO CO., 588 Stuart Bldg., St. Louis, Mo.

Name.....

Address.....

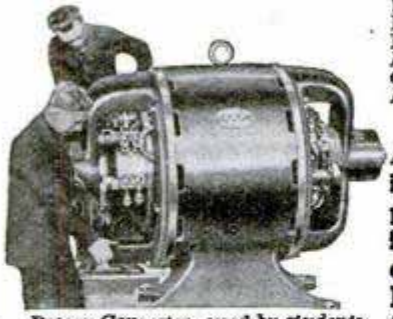
FREE—Trial Plapao—FREE

I'll Pay Your Railroad Fare to Chicago Without Extra Cost

UP TO $15,000 a year for GREER GRADUATES

ELECTRICITY, AUTOS, AVIATION now pay hundreds of trained men up to $200 A WEEK. Here are THE 3 WORLD'S GREATEST BUSINESSES. *BILLIONS*—not millions, but *BILLIONS* of dollars are spent in them every year. *CHOOSE ONE OF THESE THREE, HERE and NOW.*

GREER trained men are *NEEDED. I HAVE MADE* hundreds of $10,000 *A YEAR MEN.* 90,000 in the last 26 years have come to GREER. *THOUSANDS MORE* in the future will likely come here. *BE ONE OF THEM.* Send coupon to me for openings.



Rotary Converter, used by students for testing

Amazing Opportunities for you in one of World's 3 Biggest Businesses

MEN WANTED

I will help you get a position while learning; also after graduation. Never before such unusual opportunities. *GET MY FREE BOOK NOW.* LEARN ABOUT THE BIG PAY, ELECTRICITY, AUTOS, AVIATION, lead WORLD'S BUSINESS. That's why GREER College selected these Fields and ONLY THESE.

Learn to Boss the Job

ELECTRICITY AUTOS

Learn in Only 3 Months in GREAT GREER SHOPS ON LARGE LIVE EQUIPMENT

Mine is NOT A CORRESPONDENCE COURSE. You can start any day or any evening. It is *PRACTICAL*, EASY, QUICK, FASCINATING training. You learn on *Great, running, live Equipment* in tremendous GREER SHOPS. *AUTO* Business is BIGGEST BUSINESS in the world. *ELECTRICITY* is FASTEST GROWING, and yet in its Infancy. *AVIATION*, most fascinating, alluring business today, is already a Billion Dollar Industry.

Choose one of these 3 wonderful professions today. Trained men are needed by scores, for positions up to $200 a week and up. Find out now, about my great Shops training.

full of HARD THEORY—NO HEADACHES in GREER PRACTICAL SHOPS TRAINING. You *learn to DO BY DOING. You learn to fly by flying.*

You Get Real Help to BIG JOBS !

TWELVE PEOPLE are in my Big *EMPLOYMENT DEPARTMENT* getting jobs for Greer men. You get their help AS OFTEN AS YOU NEED IT, both BEFORE and AFTER Graduation.

Quickest, Easiest of Ways to Become Expert

I'LL PAY YOUR FARE HERE FREE of extra cost, then help you to a JOB WHILE LEARNING. Then I not only FIT YOU to get BIG PAY JOB, but I'll help YOU HOLD IT. Young and Old, Educated and Uneducated, Inexperienced and Experienced have found GREER SHOPS training *EASY, FASCINATING and VALUABLE.* Coupon below brings details.

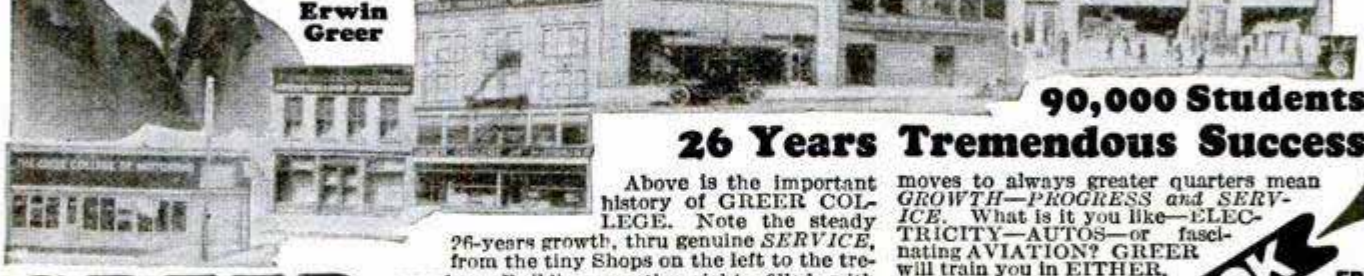
Get My FREE BOOK NOW

Don't let money hold you back. Get my Free Book. Find out *NOW*, how I PAY YOUR FARE HERE, let YOU ATTEND EITHER *DAYS* or *EVENINGS* and help you find DAY or EVENING WORK to PAY YOUR EXPENSES while learning. Then when ready we help you find the real BIG PAY JOB. LEARN how I get you ready so Employers WANT YOU, and GLADLY pay you what you are worth.

Erwin Greer

Not Correspondence Course

Here at GREER SHOPS you learn on BIG, ACTUAL FULL SIZE Machinery, like you will work on or out on the Big Pay Job. You get close personal supervision. NO Guess work—NO books



90,000 Students
26 Years Tremendous Success

Above is the important history of GREER COLLEGE. Note the steady 26-years growth, thru genuine *SERVICE*, from the tiny Shops on the left to the tremendous Building on the right, filled with GREAT TRAINING Equipment. These moves to always greater quarters mean *GROWTH—PROGRESS and SERVICE.* What is it you like—ELECTRICITY—AUTOS—or fascinating AVIATION? GREER will train you in EITHER, as *YOU SHOULD BE TRAINED.*

GREER COLLEGE

Electricity—Autos—Aviation

Dept. A01

2024 So. Wabash Ave.

CHICAGO, ILL.

Get My Big Offer Now!

Would an offer of $100 a week be OPPORTUNITY or *DISAPPOINTMENT* for you? If you could HOLD the JOB it would truly be OPPORTUNITY. If you can't hold the $100 a week job, *PREPARE.* Be ready. Don't invite disappointment. Learn about GREER SHOPS. Right now if you act quick, I can make you a most unusual short time offer. Clip coupon NOW and find out. Address me personally

ERWIN GREER, President

SCISSORS FOR FREE BOOK

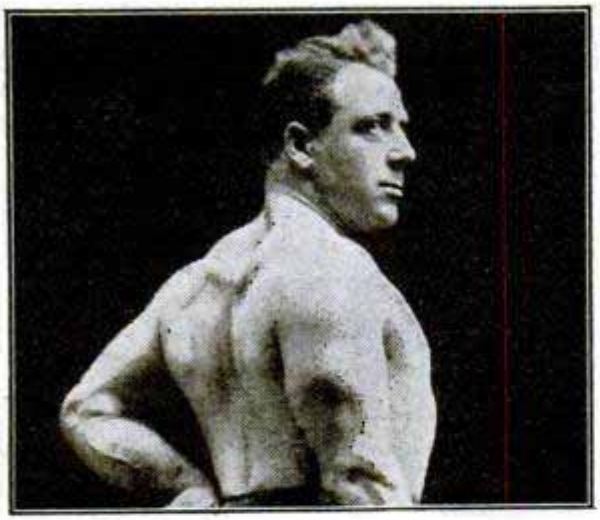
ERWIN GREER, President
Dept. A01
2024 So. Wabash Avenue,
Chicago, Illinois

Send Free Book indicated below and details of Special offer, without obligation to me.

☐ Autos ☐ Electricity ☐ Aviation

Name.....

Address.....



"I will give you nerves of steel and muscles like iron"

George F. Jowett.
CHAMPION OF CHAMPIONS

I WAS once a weakling. But I craved to be strong. I increased my chest from a puny 32 inches to 47 inches. I built up my weight to 200 pounds; my neck to 18¾; my biceps to 18; forearms to 15½; wrists to 8½; thighs to 26; my calves to 17.

Famous Athletes Indorse My Methods

My methods are indorsed by physicians and by Herman Gorner, the strongest man in the world; Arthur Dandurand, the Canadian Sandow; Arthur Gay, winner of the first prize in America's Most Perfect Man Contest; and Jim Londos, the famous wrestler.

Ask any of these men about my system and they will tell you there is no bunk about it. They will tell you that George F. Jowett plays the game square. I value that reputation more than all my medals—more than all my records and cups.

Pair of Dumbbells Free

To every person who takes my course I will give a pair of the patented Jowett Progressive Disk Dumbbells. They cannot be equaled for workmanship and muscle building. Here's another point—my course is laid out personally for each pupil. Every week you receive a new set of exercises in order of progression. You get Twelve Courses covering the Twelve Principles of Life and on conclusion of your course receive an emblem as a graduate of the Jowett Institute of Physical Culture. I guarantee to build you over in 90 days or return every penny you have paid me. My easy payment plan provides a way for every person to be a Jowett Pupil.

Get My Big Free Book

All I ask is this. Send for my big free book, "The Thrill of Being Strong." You'll get a real kick out of it because of the photographs and because it shows how easily you, too, can have nerves of steel and muscles of iron. Snap to it, buddy, and get that coupon into the mail before another day goes by. Remember, the book is FREE.

JOWETT INSTITUTE OF PHYSICAL CULTURE
Dept. 4-H
597 Fifth Avenue, New York, N. Y.

Dear Mr. Jowett:
Without cost or obligation, please send me a copy of your illustrated booklet, **"The Thrill of Being Strong."**

Name.....

Address.....

BE A RAILWAY TRAFFIC INSPECTOR

No Hunting For a Position After Completing Your Training

DO YOU WANT TO EARN A REAL SALARY

in a pleasant profession where you are practically your own boss, see new faces and places each minute, are rapidly promoted? Would you like to be out in the open, away from dirty shop or monotonous desk—dressed in good clothes—a credit to yourself and your firm?

POSITION OPEN—WAITING for YOU

All over the country—perhaps in your own town—men are needed in Railway Traffic Inspection. You can take one of these positions after a few months' spare-time home study. And upon completion of your studies, we'll assist you to a position paying at least $120 per month to start, or refund your tuition. Lessons are easily understood—no previous training required—and you are equipped to accept a position as soon as you complete your training.

During the last nine years we have offered positions to 99.5% of our graduates, or refunded their money.

Read What Joe Ettle says—

I am earning $192.00 per month and I have the knowledge and satisfaction that my work is highly satisfactory to my superiors.

I am far more than satisfied and received far more than I expected when I first subscribed for your course.

Considering you the greatest benefactor that has come into my life, I am,
(Signed) JOE ETTLE.

Send for Free Booklet

Learn today about this great, uncrowded profession—and our refund and employment agreement. Free booklet tells all about Traffic Inspection—how we have been able to place our graduates in positions at $120 or more per month—why they are so soon promoted to positions paying $175 to $250 per month—and what we can do for you.

STANDARD BUSINESS TRAINING INSTITUTE
Div. 2, Buffalo, New York

EARN UP TO $250 PER MO.

LEARN ELECTRICAL TRADES

Practical Training on Massive Lay-Out of Expensive Electrical Equipment. Armature Winding, House Wiring, Electric Welding, Electric Refrigeration, Power Plants, Switchboards, Transformers, Motors, Generators, Radio Batteries, Automobile Course included without extra cost. Write Today for Free Catalog.

COLEMAN ELECTRICAL SCHOOL, 1628R Main St., Kansas City, Missouri

Great Athletic Book 10c

Be strong and athletic. Learn **wrestling,** self defense, jiu-jitsu. Let **Farmer Burns,** Mgr. **Frank Gotch, World's Champion,** teach you. Great opportunity for young men. Makes you strong, healthy and skillful.

Send 10c for 32-page book showing great holds and tricks by Burns and Gotch. Only a few at this price. Write today, giving your age.

Farmer Burns School of Wrestling, C337 Ramge Bldg., Omaha, Neb.

30 Days' Free Trial

New Models now ready for delivery direct from our factory. *Astonishing* low prices and terms. Do not buy until you get them. **RIDER AGENTS WANTED** to ride and exhibit sample. Make big money. Many models $21.50 up. **Tires** *Guaranteed $1.50* each, wheels, lamps, horns, equipment at *half usual prices.* **Send No Money.** Write for our marvelous prices and terms on RANGER Bicycles.

Mead CYCLE CO. Dept. M-108 CHICAGO

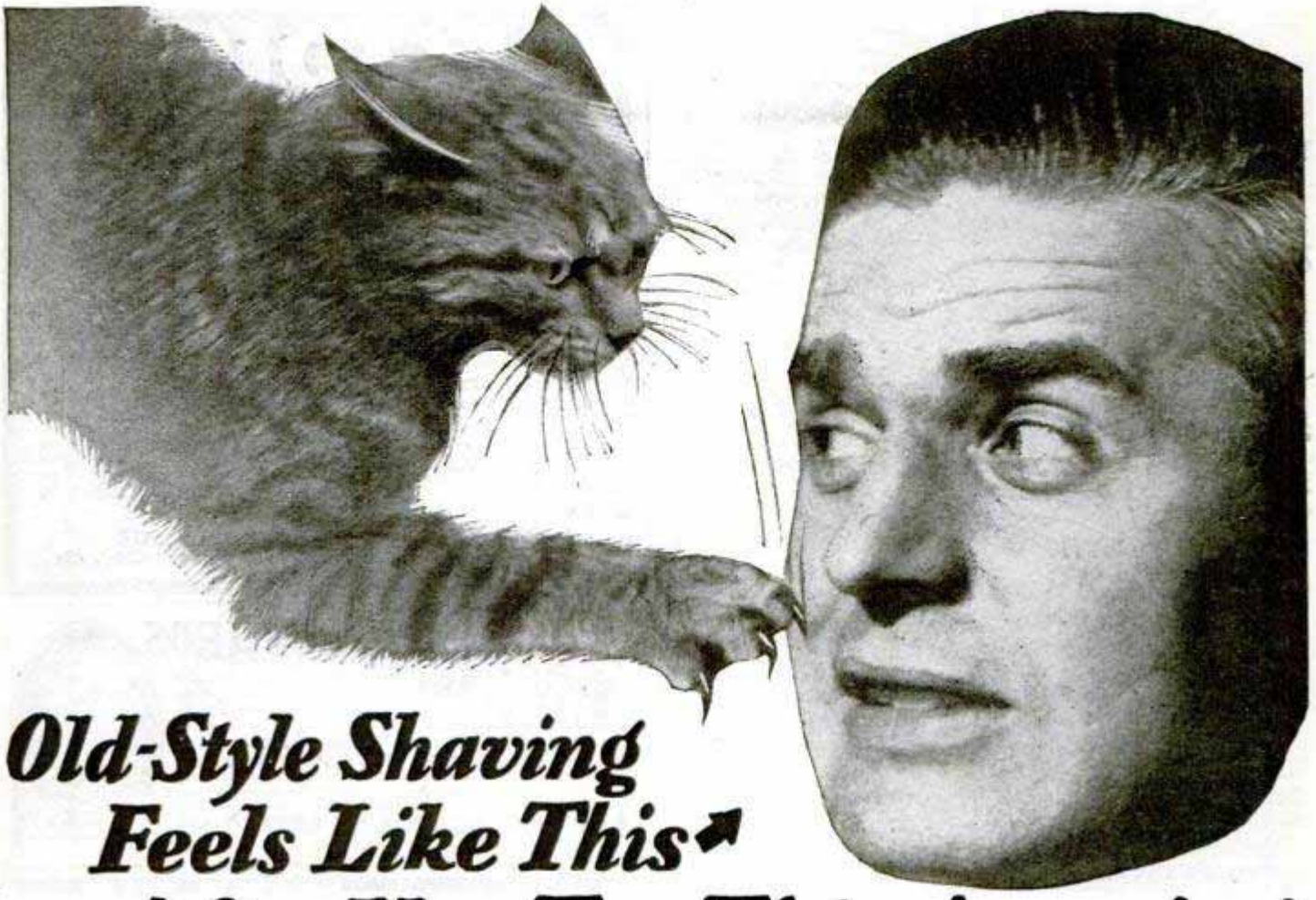
MECHANICAL DENTISTRY

Earn Up to $5000 a Year THIS money-making profession easily learned in **a few months in day** or **evening** sessions. **Practical** training. **Individual** instruction. Easy terms. Railroad **fare allowed**—no extra cost. Write **NOW** for **free catalog P** and **special tool offer.** *Address*—

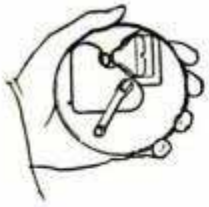
N. Y. SCHOOL OF MECHANICAL DENTISTRY, 147 W. 33rd St., N. Y.

YOU CAN OIL PAINT

Amazing new method teaches men or women to earn after first lesson. OIL PAINT photos — portraits, landscapes or art subjects. Earn $18 to $50 and more a week. OIL PAINT OUTFIT GIVEN. Send now for free illustrated book. PICTORIAL ART STUDIOS Inc. Dept. MP. 2926 Broadway, Chicago, Ill.



Old-Style Shaving Feels Like This — After You Try This Amazing *New* Way to Shave!



Marvelous Invention Makes Old Blades Keener Than New—Indefinitely! Gives Such Cool, Slick Shaves That Old-Style Methods Seem Like 16th-Century Torture In Comparison! See Valuable FREE OFFER Below! Get Details Today!

No More Blades to Buy!

SLICK, velvety shaves forever and no more razor blades to buy! That's what you can expect from KRISS-KROSS, the amazing *super*-stropper and blade *rejuvenator!* Makes new blades out of old a surprising way — week after week, month after month. Gives them a sharpness they seldom possess even when *brand new!* No wonder experts pronounce it one of the greatest inventions ever patented!

All Brands of Blades

KRISS-KROSS renews all kinds of blades (except Durham). Employs famous diagonal stroke of master barber. Eight "lucky leather grooves" do the trick in 11 seconds. Automatic, decreasing pressure—starts *heavy* and finishes *light*. Nickel jig flies up to notify you when blade is ready with *keenest cutting edge steel can take!*

Special! FREE Gift!

Right now, to introduce KRISS-KROSS stropper which is never sold in stores, I am giving with it FREE a unique new kind of razor. Really 3 razors in one! Gives *sliding* instead of *pulling* stroke. Reduces beard resistance 45%. Send for details and offer today. No obligation. Just clip the coupon and mail it now!

Rhodes' KRISS KROSS STROPPER

RHODES MFG. CO.,
Dept. K-372, 1418 Pendleton Ave., ST. LOUIS, MISSOURI

Excellent Money For AGENTS! $30 A DAY AND UP

KRISS-KROSS is one of the most surprising money-makers ever seen. Hundreds of agents and demonstrators all over the country are receiving $200 to $500 a month just collecting orders in their home towns. Even spare-time workers often make $6 to $12 an evening or Saturday afternoon. . . . R. S. Hopkins (Mich.), $20 his first day. And J. C. Kellogg (Kansas) made $200 in 7 days spare-time alone! . . . With men everywhere making big easy profits like this, there is no reason why you can't do the same. We show you how and give you an extremely generous offer. . . . Get details today. Check bottom line of coupon and mail it now!

**Rhodes Mfg. Co., Dept. K-372,
1418 Pendleton Av., St. Louis, Mo.**

Without obligation, send me details of KRISS-KROSS Stropper, together with 3-way razor offer FREE.

Name.....

Address.....

Town.....State.....

☐ Check here if interested in becoming representative.

"There's the *new* Ned Tyson"

He's making $6500 *a year now*

"I USED to know him when he was a kid—we went to grammar school together. Then his father died and he had to go to work. Got a job with Brooks & Watson as a clerk, but couldn't seem to get ahead.

"Then something seemed to wake him up. We could all see that he was doing better work.

"Then Old Man Brooks became interested—wanted to know how Ned happened to know so much about the business. Ned told him he'd been studying at home at nights through the International Correspondence Schools. 'H'm,' said Mr. Brooks, 'I'll remember that.'

"He did too. Put Ned out on the road as a salesman for a year or so and then brought him into the main office as sales manager.

"He's getting $6500 a year now and everybody calls him 'the new Ned Tyson.' I've never seen such a change in a man in my life."

An International Correspondence Schools course will help *you* just as it helped Ned Tyson. It will help you to have the happy home—the bigger salary—the comforts you'd like to have. At least find out how.

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 5550-F, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject before which I have marked X in the list below:

BUSINESS TRAINING COURSES

☐ Industrial Management	☐ Advertising
☐ Personnel Management	☐ Business Correspondence
☐ Traffic Management	☐ Show Card and Sign Lettering
☐ Business Law	☐ Stenography and Typing
☐ Accounting and C.P.A. Coaching	☐ English
☐ Cost Accounting	☐ Civil Service
☐ Bookkeeping	☐ Railway Mail Clerk
☐ Secretarial Work	☐ Common School Subjects
☐ Spanish ☐ French	☐ High School Subjects
☐ Salesmanship	☐ Illustrating ☐ Cartooning

TECHNICAL AND INDUSTRIAL COURSES

☐ Electrical Engineering	☐ Architect
☐ Electric Lighting	☐ Architects' Blueprints
☐ Mechanical Engineer	☐ Contractor and Builder
☐ Mechanical Draftsman	☐ Architectural Draftsman
☐ Machine Shop Practice	☐ Concrete Builder
☐ Railroad Positions	☐ Structural Engineer
☐ Gas Engine Operating	☐ Chemistry ☐ Pharmacy
☐ Civil Engineer	☐ Automobile Work
☐ Surveying and Mapping	☐ Airplane Engines
☐ Metallurgy and Mining	☐ Agriculture ☐ Navigation
☐ Steam Engineering	☐ Mathematics ☐ Radio

Name.....

Street Address.....

City.....State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

ELECTRICITY

Tremendous demand for Practical Trained Electricians and Engineers at Big Salaries. Fascinating work, rapid advancement, opportunities unlimited.

12 Weeks Intensive Courses in PRACTICAL ELECTRICITY and POWER PLANT OPERATION covering Wiring, A. C. and D. C. Motors and Generators, Transformers, Armature Winding, Radio, Farm Lighting, Power and Light Switchboards, Electric Elevators, Electric Refrigeration, Batteries, Power Plant Operation, Automotive Electricity. **These courses open to you NOW.**

ONE and TWO YEAR COURSES in ELECTRICAL and MECHANICAL ENGINEERING leading to degrees. Registration for these courses open from September 15th to October 15th. Laboratories and shops extensively equipped with modern machinery and apparatus. Faculty of recognized experts, 27th successful year. Free employment bureau. Send for free catalog.

FINLAY ENGINEERING COLLEGE
308 Finlay Bldg. Kansas City, Mo.

Learn to PAINT SIGNS and SHOW CARDS

We quickly teach you by mail, or at school, in spare time. Enormous demand. Big future. Interesting work. Oldest, foremost school.

EARN $50 TO $200 WEEKLY

John Vassos, N. Y., gets $25 for single show card. Crawford, B.C., says: "Earned $200 while taking course." Send today for free information, samples and guarantee.

DETROIT SCHOOL OF LETTERING
154 Stimson Ave. Est. 1899 Detroit, Mich.

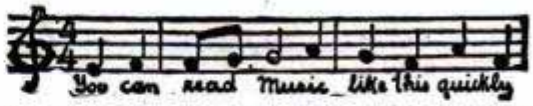
Raise Poultry MAKE BIG MONEY

Results Quick—Part or Full Time

Take up poultry raising. It's interesting, healthful, PROFITABLE. Easy to sell all you can produce at big prices. Our new course by Henry M. Lamon, former gov't expert, gives short cuts to success. Write for free book, "How to Raise Poultry for Profit."

NATIONAL POULTRY INSTITUTE, Dept. 411, Washington, D. C.

MUSIC LESSONS IN YOUR HOME



Write today for our **FREE booklet.** It tells how to learn to play Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc. Beginners or advanced players. Your only expense about 2c per day for music and postage used. **American School of Music, 51 Manhattan Bldg., Chicago.**

LEARN WATCHMAKING AND ENGRAVING

BY OUR PROFIT-SHARING PLAN

OUR GRADUATES SUCCEED

One of our Iowa students started in a very small way—now doing over $30,000 a year. Another in Wisconsin, over $10,000 the first year. Day or night classes. Call or write for FREE BOOK.

Chicago School of Watchmaking, Dept. 4301, 549 W. Randolph St., CHICAGO

ZIP-ZIP SHOOTER

THOUSANDS of boys are made happy with this wonderful Zip-Zip shooter, something every boy wants and never gets tired of. Zip-Zip shooter is scientifically and practically made; if you like hunting and outdoor sports, get a Zip-Zip shooter with plenty of pep and force. If your dealer happens not to have them, order from us. Zip-Zip shooter **35c or three for $1.00;** send stamps, coin or money order.

AUTOMATIC RUBBER CO., Dept. B. B., COLUMBIA, S. C.

Bald Men Look! FREE

One Full Ampoule of my amazing hair fluid which I discovered myself and which grew hair on my head.

This Ampoule is absolutely free. Don't send any money. There is no C. O. D. No charge whatsoever. All I want is an opportunity to show you how easily I grew hair on my own and hundreds of other men's heads. Merely mail the coupon below for Free Ampoule.

Here is How I Used to Look

I was just as bald as this picture. It is a true photograph without any tampering or retouching. It is exactly like I used to look. Then look at the full head of hair I have in the picture on the left!

As I have stated so often, I don't know whether I am the first man who discovered this great secret, but I do know I have it, that I grew my own hair and that I am growing hair on the heads of other men all the time.

Bald Men Grow Hair Quick!

I grew my own hair just as it shows here.

I will prove to you FREE that I can grow hair, quick.

Here is Brennan
Brennan while he was bald.

And Brennan after Vreeland grew his hair. Write and I will tell you Brennan's story and give you his address.

Here is Wiseman
Wiseman was bald like this.

But Wiseman grew this head of hair with my wonderful hair growing fluid. All about Wiseman and how he did it, if you write. You'll get his address too.

What I accomplished on my own head and on other heads I can do for you, provided you are under 45 years of age and loss of hair was not caused by burns or scars. Anyhow, I must succeed or you pay nothing. No apparatus. My home treatment is simple, quick, inexpensive.

Mail this FREE Coupon

Mail the coupon today—Right Now—I will send you, immediately, one full Ampoule of my marvelous fluid which I discovered, of which I hold the secret and which grew my own hair on my own bald head. Besides the Free Ampoule of Fuid, I will send photographs, names and addresses of men and women who successfully used my Wonder Fluid for Dandruff, Falling Hair and particularly for Baldness.

VREELAND C135 Euclid-Windsor Bldg. CLEVELAND, OHIO

FREE COUPON

VREELAND C135 Euclid-Windsor Bldg. CLEVELAND, O.

Please send me, entirely free, one full Ampoule of the same Wonder Hair Fluid which grew your hair.

My Name ----------

My Address ----------

State ----------

POINTS THE WAY TO

MORE PAY

OUTFIT Free

DOES THIS HIT YOU? Are you a mechanic? Do you follow carpenter trade? Are you a wood worker, sheet metal worker, millwright, etc.? Here's great news.

Short and Practical Course Puts More Pay in Envelope

Learn blue print reading and elements of drafting. Merit promotion. Put yourself in line for advancement. **Turn your spare hours into profitable investment.** Study fascinating lessons in practical way. No dreary book reading. No complicated problems. Our course is so easy, pleasant and interesting. **Practical men teach you.** No theory. Just matter-of-fact instruction. You're bound to learn. Our course one of the

Lowest Priced Ever Offered

Endorsed by employers. Opens way to more pay for you. **We teach you in few weeks what many men have taken years to learn!** FULL DRAWING EQUIPMENT sent the very minute you enroll. Write. Get our wonderful proposition. Our low price and extremely easy terms will interest you. Fill out the coupon.

SEND COUPON

BLUE PRINT READING SCHOOL, Inc.
1722 Nicholas Bldg. Toledo, Ohio

Name.....

Address.....

$1000 Profit for Agents!

An All Year Round Income without Investment

Everyone is ever thinking of jewelry as gifts for dear ones or for themselves—every one is wondering not only what to select but how to conveniently pay for it. Show them our plan of easy payments. Show how easy it is to have a beautiful diamond ring, watch, silverware, etc., and have twelve months to pay. Our agents earn from $50.00 to $200.00 weekly, selling on cash or credit. We put you in the jewelry business for yourself and carry the stock for you. You make no investment. You merely take orders and earn very liberal commission.

Send for FREE *Outfit* TODAY

Write for complete free outfit, which contains catalog in colors, order blanks and full instructions. We send by return mail everything to start you earning without delay—**Write today.**

Sterling Diamond & Watch Co., Inc., Dept. A-167
1540 Broadway, New York, N. Y.

Write and Speak MASTERLY ENGLISH

Learn correct English with Sherwin Cody's new invention. No rules to memorize. Like a fascinating game. Spare-time study, 15 minutes each day, quickly gives you masterly command of English. Interesting booklet sent free. Write today. **Sherwin Cody School of English, 58 Searle Building, Rochester, N. Y.**

Write today for our 168 page FREE Book on

Deafness

and learn how Perfect Hearing is now being restored in every condition of deafness or defective hearing. Our *"Little Wireless Phones for the Ears"* require no medicine but effectively replace what is lacking or defective in the natural ear drums. They are simple devices, which the wearer easily fits into the ears where they are invisible. Soft, safe, and comfortable.

WILSON EAR DRUM CO., Incorporated
376 Todd Bldg. LOUISVILLE, KY.

MONEY IN YOUR NEIGHBORHOOD

Here's a Wonderful Way to Get It

Our beautifully illustrated book tells how. It tells all about our new methods of art decoration, art treatment and how anybody can learn without previous training or experience. It contains page after page of handsome color illustrations of what you can make and sell. You can make good money and this book is free. Our system is amazingly easy to learn and the profits are larger than in almost any other business. You can produce beautiful finished art objects almost from the beginning. You don't have to know how to draw or have any experience. Begin making money now.

All supplies are sent by us with the instructions and many have made $25 the first week. Some society women have taken up this work for their own amusement.—Either way, pleasure or profit, it's the most delightful home work you can imagine. Write Now for your copy of this valuable book: it's FREE.

FREE

Fireside Industries
DEPT. 66-K ADRIAN, MICH.

BOYS

Mail Coupon for Free Booklet

Learn ELECTRICITY

STUDY right at home in spare time to get a good position in this fascinating profession or have a business of your own. Complete, practical, well-illustrated electrical courses of International Correspondence Schools make every step easy. Cost $200,000 to prepare. Written by well-known electrical engineers. Endorsed by Edison and Steinmetz.

INTERNATIONAL CORRESPONDENCE SCHOOLS, Box 5554-F, Scranton, Pa.
Without cost or obligation, please send me booklets describing your courses in
☐ ELECTRICITY ☐ RADIO ☐ AIRPLANE ENGINES
☐ Drafting ☐ Civil Engineer ☐ Chemistry ☐ Automobiles

Name.....

Address.....

Worth Money to Ruptured!

Send New FREE BOOK and Amazing FREE SAMPLE of AIRTEX Without Obligation

Name.....

Address.....

City.....State.....

Mail this coupon to New Science Institute, 2151 Clay Street, Steubenville, Ohio

Here is an amazing offer to victims of rupture—an offer that has proved to be worth hundreds of dollars to many who ha e accepted it. Yet it costs you nothing.

A famous rupture specialist with a record of more than 20,000 cases will send you free of cost a newly-edited book that contains amazing new discoveries about rupture relief . . . case histories galore . . . illustrated in detail. A few of the facts contained in this free book are given below. But do this right now. Tear out the coupon at the right and send for this unusual book!

Can Rupture Be Exercised Away? Get Newest Book Now FREE to Ruptured

"IT was twenty years ago when I first got ruptured. Today I consider myself entirely cured. Your system is nothing short of marvelous." John Miller, Jr. "Some months ago I ordered your outfit for the treatment of rupture of my son. Our doctor fitted it on him and he was skeptical it would help cure the condition, for it was one of the worst ruptures he had ever seen. Five months later I took the boy back to the doctor. He examined him and pronounced the rupture completely healed." D. E. Lytle, Orrville, Ohio.

These are but two of many astounding letters received from people, many of whom had despaired of obtaining relief from the torture and agony of rupture.

Never Before a FREE SAMPLE Like This

Not a Truss

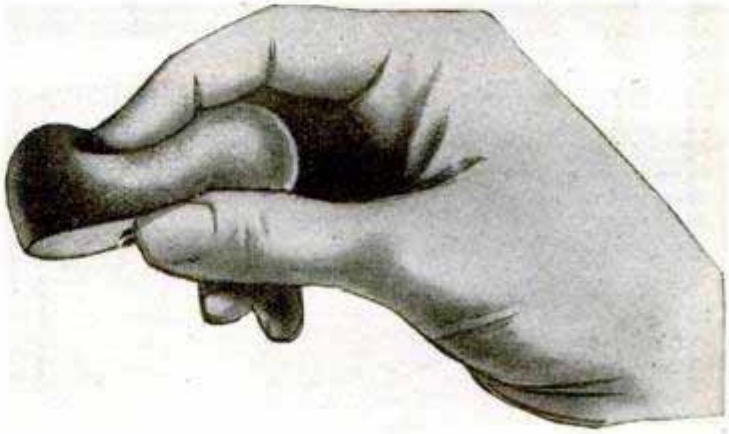
What is this wonderful device that has made thousands feel again the joy of living a full life? It is not a truss like men wore in the days of Lincoln. It has no steel springs, no leg straps, no bulky cushions. It can never slip off the rupture. Wearing it, you can still cough, run, jump, bend or sleep in any position. In fact, many are able to work every day—exercise as much as they desire—probably we should say truthfully actually EXERCISING RUPTURE AWAY!

Imagine a simple little device weighing less than a feather—little larger than a quarter—that rests firmly against the rupture without the need of strapping tightly. Think of a flesh-soft pad that yields with the slightest movement of your body—filled with millions of air-cells that breathe fresh, cool air into the spot around the rupture. And all the while blood circulation is more free and more unhampered. Thus nature is allowed to knit new tissues together so that rupture often disappears completely without a trace remaining—in unbelievable time. Incredible? Yet the facts are ready now!

Now or Never

Be fair to yourself. Get the complete facts about Magic Dot and the offer that permits you to feel this marvelous relief, before you decide to buy. Don't go through life in constant pain. Relief from rupture is certainly worth the 2c stamp it costs you to send the coupon above. Send it—not tomorrow or next week—but NOW!

NEW SCIENCE INSTITUTE
2151 Clay Street
Steubenville, Ohio



We Will Train You in a Few Months

Day and Night Schools in Chicago Detroit Cleveland Boston Phila.

Experts Earn Up To $125 a Week

as MECHANICAL DENTISTS

We teach you to make rubber plates, crowns, bridge work, metal base dentures, etc., for dentists. After graduating you are ready for a job or can open your own laboratory. We assist you.

Big Demand for Men!

Mechanical Dentistry is the laboratory bench work which the dentist turns over to the laboratory worker. Master this profession and help meet the demand of 64,000 dentists for laboratory work. Every city and every town where dentists are located offers work to the mechanical dentist. We train you in a few months in day or night school for this uncrowded field—no classes—no books—no mechanical experience necessary.

Work Your Way Thru School

We will help you find a job to meet your expenses while taking our training. And we will help you find satisfactory living quarters when you arrive.

Schools located in *Chicago, Detroit, Cleveland, Boston, Philadelphia. Day* and *night schools.*

INTERESTING FREE BOOK

Our illustrated, free book on Mechanical Dentistry will acquaint you with some surprisingly interesting facts. It tells about the thriving profession of Mechanical Dentistry—the way to swift and certain success. And it tells about the progress of many of our graduates—men who have succeeded beyond their expectations, also full details of our liberal offers. Mail the coupon and find out more about this fascinating opportunity.

McCarrie School of Mechanical Dentistry
1338 S. Michigan Ave., Dept. 178, Chicago, Ill.

McCARRIE SCHOOL OF MECHANICAL DENTISTRY
1338 S. Michigan Ave., Dept. 178, Chicago

Without cost or obligation, send me your illustrated book on Mechanical Dentistry, and complete information as to my opportunities in dental laboratory work

Name.....

Address.....

$75 A WEEK BUILDING RADIO SETS

now being made

Join the Radio Association of America. Let it train you to build and repair sets, to be the "radio doctor" of your community. $3.00 an hour easily made in spare time.

$500 Earned in Spare Hours

Lyle Follick, Lansing, Mich., writes: "Have already made over $500 in spare time." He is just one of many. Our members are starting radio stores, securing better positions, passing radio operator examinations, qualifying as big-pay Radio Experts, as well as making money spare time. **6-Tube Radio Set FREE to members.**

Join the Association Now! By our **Special Plan** your membership need not cost you a cent. Number of these memberships limited. Write for details NOW!

RADIO ASSOCIATION OF AMERICA, 4513 Ravenswood Ave., Dept. PM-8, Chicago, Ill.

Poor English!

How much is it costing you in wasted opportunity?

Every day your associates are judging you—by what you say and how you say it! Hazy ideas, ill-chosen words, halting sentences, crude, slovenly speech—these mark a man as loose in thinking. Thoughts clear-cut, words that give true shape and color, sentences aflame with power and originality—these are the things that proclaim ability, that win for their users swift advancement. Stop apologizing for poor English—it's inexcusable! In the quiet of your home—with LaSalle's help—you can learn to speak and write with real distinction, learn to make the words you utter and the letters you compose stamp you as educated, cultured, a power to reckon with in the business world. Complete details in an attractive 32-page book, "Effective Business English," sent you free upon request. Ask for it TODAY.

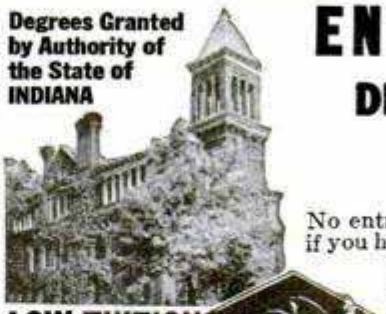
LaSalle Extension University, Dept. 864-BE Chicago

MEN TO LEARN

MOTION PICTURE PROJECTION

A BIG-MONEY PROFESSION—$2,000 TO $4,000
We Assist Students to Earn While Learning
MOVIE OPERATORS SCHOOL
61 Sproat Street Detroit, Michigan

Degrees Granted by Authority of the State of INDIANA



ENGINEERING

DEGREE *in* 2 *Years!*

No entrance exams required. And if you haven't a high school diploma we'll give you the essential subjects.

If you want to be a graduate ENGINEER and earn $50 to $150 a week, come to TRI-STATE College. We are interested in helping men who may be short of money and time, but are strong in the desire to improve themselves. Time cut to 96 weeks by eliminating frills and concentrating on Science, Mathematics, Drafting, Laboratory and field-work.

B. S. (Bachelor of Science) degree in Engineering conferred by State authority.

LOW TUITION
—small living expense

Rooms in private homes $2.00 to $3.00 a week. Meals $3.50 to $5.00 a week. Tuition about half the average. Employment service for graduates free. No extra fees except for chemistry laboratory materials. Wonderful bunch of students. Terms start Sept., Jan., March, June. Mail coupon for free catalog.

Electrical
Civil
Mechanical
Chemical
Administrative

TRI-STATE COLLEGE, Box E-C 113, ANGOLA, IND.

Tri-State College, Box E-C 113, Angola, Indiana

☐ Civil
☐ Electrical
☐ Mechanical
☐ Chemical
☐ Administrative

Send free book of complete information of your 2-year Engineering Courses. (Mark X at left.)

Name.....

Address.....

Learn Auto Mechanics

In 8 Short Weeks

Regular Shop Work—No Books

STEP RIGHT INTO A BIG PAY JOB

I'll Pay Your R·R· Fare to Cincinnati

Why go on begging for a raise? Why growl and complain because you don't get it? Why, when every city, town, and farming community is pleading for more auto and tractor mechanics—trained as McSweeny students are trained, to know cars of every make and to know them "inside out"?

What They Write Me:

"My last pay check was $83.97. I learned battery work with you." —Clarence Mitchell, Michigan.

McSweeny Men Make Good

Every month my men are taking fine jobs formerly filled by half-trained students or half-baked, self-trained mechanical tinkerers. Let me send you the "proof," letters from former McSweeny students now earning up to $10,000 a year, and few earning less than $50.00 a week. "Mac's SHOP WAY Means Bigger Pay."

Employment Department Helps You

My employment department aids students to find spare time work while they study, and also helps graduates locate good-paying positions. Mac doesn't forget about his graduates after they finish his course.

No Experience or Education Necessary

Think of it! Working with real tools on real equipment you become in only EIGHT WEEKS a better auto mechanic than men who have "fiddled" around an ordinary garage for years trying to learn. No previous experience or education necessary. You learn by doing practical jobs on real equipment with real tools.

Your Money Back Guaranteed

If, when you have finished your training, you are not perfectly satisfied; if you are not qualified to fill a big pay job, I will refund every cent of your tuition. Save one-third by writing now for fascinating, illustrated book on AUTO AND TRACTOR MECHANICS. Your copy is free. Write now for remarkable tuition offer.

McSWEENY SCHOOLS
AUTO AND TRACTOR DEPARTMENT
Cincinnati, Ohio

BIG BOOK FREE
Just Mail Coupon

McSWEENY Auto and Tractor School,
654 McMillan St., Cincinnati, Ohio., Dept. 11-K.
Please send your Big Illustrated Book, and FREE Railroad Fare and Employment Offer.

Name.....

Address.....

City.....State.....

Get this great work for your own use

ENCYCLOPÆDIA BRITANNICA

Write for FREE Booklet and full details. Dept. PM2

THE ENCYCLOPÆDIA BRITANNICA, INC.
342 Madison Ave., New York City

ILLINOIS COLLEGE of PHOTOGRAPHY

Prepares you in from 6 to 8 months to earn $200 to $500 a month as a photographer or photo-engraver. Thorough practical training. Expenses low. Constant demand for our graduates. 35th year. Enroll immediately. Free catalog. **Box 488, Effingham, Illinois.**

TRAVEL FOR "UNCLE SAM"

Railway Postal Clerks

STEADY WORK—NO LAYOFFS—PAID VACATIONS. COMMON EDUCATION SUFFICIENT. Many Other Government Jobs Open to Men—Boys 18 to 50

$158 to $225 a Month

Mail Coupon Before You Lose It

FRANKLIN INSTITUTE, Dept. F-175
Rochester, N. Y.

Sirs: Rush to me without charge—copy of 32-page book, "How to Get U. S. Government Jobs," with sample coaching, lists of positions obtainable and full particulars telling how to get them.

Name.....

Address.....

Show Card Lettering

HERE is the very course you need if you want to get a good paying position as a Show Card Letterer or Sign Letterer, or have a business of your own. This course is complete and practical and especially arranged to meet the needs of the student who studies at home. It was written by E. L. Koller, Principal of the International School of Art, member of the American Federation of Arts, and The National Society of Craftsmen.

H. L. Wood, a clerk, made more than $700 "on the side" before he had completed this course. Harry Lord writes that he has more than doubled his salary. William Whitman is earning *three times* as much as he did before enrolling with the International School of Art.

Learn at Home

Mail Coupon for Free Booklet

INTERNATIONAL SCHOOL OF ART
Division of the International Correspondence Schools
Dept. 5551-F, Scranton, Penna.

Without cost or obligation, please send me full details of your home-study course in

☐ SHOW CARD LETTERING
☐ ILLUSTRATING ☐ CARTOONING

Name.....

Address.....

STOP JUMPING FROM ONE SMALL PAY JOB TO ANOTHER

Get Into ELECTRICITY where one good job follows another-where thousands of "Cooke" Trained Men earn — $60 to $100 a week

THERE are no "hard times" for the "Cooke Trained" Man. No, sir! My "boys" make big money the year 'round. Among them, $60 a week is just an ordinary wage. Many of them draw $80, $90, $100! Some get as much as $15,000 a year! And they're never out of work. Anywhere you go, "Cooke Trained" Men are holding down the Big Money jobs and climbing the ladder of success. Why don't you? Let me help you turn that little pay check of yours into a he-man's salary — so easy and quick you'll be amazed! With my help thousands of men no smarter nor better educated than you have quickly jumped to Big Money in the great field of Electricity. It's your own fault if you don't do the same.

There's Nothing Like "Cooke" Training

Electricity is the field for you. It's the field of Big Opportunity — the field of BIG PAY. And there's nothing like "Cooke" Training for quickly boosting you into that profitable field. It's amazingly simple, practical and complete. Only your spare time needed, but you learn rapidly because my famous "Work Sheet" and "Job Ticket" Method trains you along work-shop lines — you learn by **doing** the kind of work that draws the Big Money—$3,000 to $5,000 a year, and more.

Earn While Learning — Six Outfits Given

That's the way I teach you Electricity—so you can make real money as you go along. It's nothing for one of my "boys" to step out and make a $5 or $10 bill after supper. I'll show you how to do that, too, right after you start with me. What's more I give you Six Big Working Outfits of Tools and Apparatus without a penny's extra cost, to work with and make extra money with.

Get Started — Mail Coupon

Right now—this very minute—make up your mind to make Big Money. Get my Big Free Book that has started so many discouraged men on the road to success. Read the whole wonderful story, the enthusiastic letters from my "boys", the positive Money Back Agreement. It's a book of wonders that will make a new man of you. Get it. No obligation. Just mail coupon NOW.

L. L. COOKE, Chief Instruction Engineer
L. L. COOKE SCHOOL OF ELECTRICITY
Dept. 1-C, 2150 Lawrence Ave., Chicago, Ill.

I have trained over 50,000 men for Big Pay Electrical Jobs under this Contract. Now I offer the same Contract to you — you must be satisfied or you get your money back.

FREE BOOK COUPON

L. L. COOKE, Chief Instruction Engineer, Dept. 1-C, 2150 Lawrence Ave., Chicago, Ill.

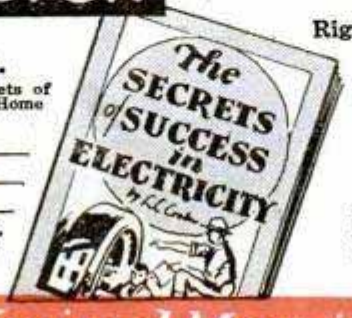
Send me FREE and prepaid, your Big Book "Secrets of Success in Electricity," with all details about your Home Study Course in Electricity.

Name _____

Address _____

City _____ State _____

Residents of Canada send coupon to R. A. Farrow, Special Representative, 7 Medbury Lane, East, Windsor, Ontario, Canada.



The "Cooke" Trained Man is the "Big Pay" Man

Classified Advertisements

WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 30 cents per word, each insertion, minimum 10 words, payable in advance.
To be inserted under proper classification in September issue, copy should be in our office July 18th

ADVERTISING AGENCIES

ADVERTISE In 24 Big Sunday Newspapers, 24 words $15.00. Excellent for securing agents, salesmen and business opportunities. Catalog listing 1,000 leading dailies, weeklies, mail order magazines. Everything. Free. Wade Advertising, Baltimore Bldg., Chicago.

GET Into advertising. Learn quickly at home. Experience unnecessary. New easy plan. No text books used. Practical work. Old established school. Send name and address for interesting free booklet. Page-Davis School of Advertising, Dept. 343-B, 3601 Michigan, Chicago.

INCH Display 50 Monthlies Thrice $8.00. Meyer Agency, 4112M Hartford, St. Louis, Mo.

ADVERTISE 50 Magazines 5c word, $4.00 inch; thrice 10c word, $8.00 inch. King-Advertising, Box 6723, Wilmington, Del.

BEFORE Advertising get our catalogue. No charge. 25 years in business. The largest classified agency in the world. Ankrum Advertising Agency, 20 W. Jackson Blvd., Chicago Ill.

LOWEST Rates. Catalog free. Owl Agency, Times Bldg., New York.

FREE—New 1928 Advertisers Rate Guide. 36 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

FOR ADVERTISERS

ADVERTISE In weekly papers. Lists free. Keator, Hartford Bldg., Chicago.

40 WORDS Insert 50 magazines $2.00. Empire Agency, Shawano, Wis.

SALES PROMOTION

$50 TO $50,000 Daily Sales Developed during 28 years for clients by our direct mail plans, copy, campaigns. One product, 1923; an idea; this year $100,000 orders booked. Fifty year old concern desired 50 natfonal representatives in 1925; we produced 40 in three months. 700 dealers in 10 months at $3 each, for another. Ten years Sales Promotion Manager Larkin Co. Submit sales problems for free diagnosis. James C. Johnson, 118A Woodbridge Ave., Buffalo.

PURPOSEFUL Advertising plans, letters and sales literature, created by experienced writer-salesmen. Submit details for sales suggestions. Werner & Associates, 24 Hutchinson Bldg., Buffalo, N. Y.

WE Will analyze your advertising, advise you on your best plan of marketing, and otherwise counsel you on your sales problems. Fee reasonable. P. A. Porter, Sales Counselor, 156 Fifth Ave., New York.

AGENCIES WANTED

FORMER Chicago business executive. Financially independent. Now permanently located in Hollywood as manufacturers' agent. Have my own offices and display room. Cover the country by mail and salesmen. Desire two more good lines to handle. Cash or commission basis. Must be highly reputable, dependable, profitable. Will consider standard articles or new specialties of merit, domestic or foreign, if sales possibilities, profits, etc., are satisfactory. For immediate attention give complete details covering goods, prices, terms, territory, etc. If consistent, submit samples. Highest references furnished. J. J. Sherlock, 1063 and 1065 North Fairfax Ave., Hollywood, Calif.

LETTER SPECIALISTS

I'LL Make your letters pay better, or refund your money. Send your problem for constructive criticism. Introductory offer only, $5.00 cash in advance. Act today! Du Bois Letter Service, 118 Garden St., Poughkeepsie, N. Y.

BUSINESS ADDRESSES

HAVE A Fifth avenue address. Secure prestige and more business. Mail forwarded hourly. Established fourteen years. Send $10.00 for four months' service. Clark Service Co., 509 Fifth Ave., New York.

AUTOMOBILE SUPPLIES

BRAND New Basco ignition switches, can be used for cars or motor boats, special 20c each; retails for $3.00. Brand new $15.00 Jewel volt and ammeters, 4" diameter, at $4.00 each. Satisfaction guaranteed. General Distributing Company, Duluth, Minn.

PAINT Your own car, preserve it and make it look like a new one with a quart of Pilot Auto Enamel, a pint of top dressing, brush and sandpaper, all postpaid for $3.00. Buy two for $5.00 and sell one. An attractive proposition for agents. Pilot Paint Products Co., Box 579, Dallas, Tex.

CARBURETOR Supplement to famous Dyke's Auto Encyclopedia. Just out. Deals with every make of carburetor. Just what every auto service man has long been in need of. 106 pages, 246 illus. Price $2.00. Send for your copy today. C. O. D. if you prefer. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

1 AUTO Gas saver sent. To introduce. All autos. Amazing mileage increases. Critchlow, H1-805, Wheaton, Ill.

SAVE Money on auto and truck repairs. Gears, axles, bearings, motor and transmission parts at 50 to 75% off factory list prices. Satisfactory parts guaranteed. Prompt service. Price lists free. Century Parts Co., 1712 Lafayette Ave., St. Louis, Mo.

TOOL Salesmen and mechanics with some sales ability sell our line electrical tools to auto mechanics and garages. Easy sales, and very liberal commissions. Barker Specialty Co., Girard, Pa.

AUTO Parts, New, Used—Lowest prices, largest stocks, bankrupt supplies, motors, wheels, rear ends, radiators, transmissions, generators, gears, tops. Brightman, 2065 Main St., Hartford, Conn.

FAMOUS Dyke's Automobile Encyclopedia—Just out, 15th edition. Fully revised to include all latest facts regarding newest developments. Information on repairing and adjusting every part of all motor cars. How to find trouble and fix it. 1,250 Pages, 4,200 Illus. Price, cloth, $6. Flexible Morocco $7.50. Will be sent C. O. D. anywhere in U. S. Pay postman price and postage when he delivers book. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago.

AUTOMOBILES

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

AUTOMOBILE—Make your own motor car, toy size, operated with motorcycle engine. Any boy can make it. Costs little aside from engine. Full directions with drawings and dimensions in The Boy Mechanic, Book 3. Send No Money. Pay postman postage and $2. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

AUTOMOBILE SERVICE EQUIPMENT

YOU Are wanted to resilver mirrors at home. Immense profits plating autoparts, tableware, etc. Write for information. Sprinkle, Plater, 77, Marion, Ind.

SLIGHTLY Used battery charging equipment guaranteed same as new at greatly reduced prices on all sizes. 8-hour constant potential chargers. Only a limited number on hand at present. Let us quote you before you purchase your equipment. All sets furnished with automatic voltage regulators. Marshall Electric Company, Elkhart, Ind.

BIG Profits in automotive service with use of new 8 hour battery charging equipment. Low in price—small down payment brings it; pays for itself with handsome profit besides. Write for details. No obligation. E. M. Connor, Box M884, Troy, Ohio.

JUNK Tires converted into saleable mds. with our Hoxie. $200 starts you. Vulcanizing tires pays 100%. Have shop outfits near you $50 up. Portable electric paint spraying outfits complete, only 50 lbs. $61 delivered. Equipment Exchange, 108 East 11th, Los Angeles, Calif.

SAVE Money—Garage equipment reconditioned and guaranteed like new. Unusual bargains in test stands, car washers, battery chargers, air compressors, etc. Shipped on trial—easy terms. What do you need to complete your equipment? E. C. Galbreath, Box M883, Troy, Ohio.

MECHANICS Make money speeding up model T Fords to perform more like new model. Instructions and blueprints one dollar. Hodgdon, 324 Bay, Springfield, Mass.

BARGAINS In repossessed battery chargers, rectifiers of all kinds and a few Constant Potential 8 Hour Chargers, two of them practically new. Lowest prices; terms if wanted; 30 days' trial. Write today to I. C. Helmick, Box M885, Troy, Ohio.

MORE Profits—With the four sizes of the Scioto Battery Chargers as prices from 10,50 to $68.00. Wholesale only. Send for latest price list. Adams-Barr, Columbus, Ohio.

AUTO Repairman—Wiring diagrams of 993 yearly models of autos, trucks and busses 1920 through 1928 including the new Ford. Splendid new book for practical mechanics on special paper to withstand shop use. Worth as much as many selling for $18 to $20. Regular price $10. Special introductory price $5. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

FOR FORD OWNERS

UNDERSLUNG With "RKO" Swing Lo Irons. See "Red-I-Cut" ad page 136.

1 AUTO Gas saver sent. To introduce. All autos. Amazing mileage increases. Critchlow, H2-805, Wheaton, Ill.

AURORA Underslung parts and 3.1 racing gears, speedster bodies. See Sport Factories ad, page 144.

FORD Reverse pedal extension. Makes reversing easier and safer. $1.00 postpaid. W. D. C. Sales Co., 899 18th St., Milwaukee, Wis.

MOTORCYCLES, BICYCLES AND SUPPLIES

MOTORCYCLES Cheaper than bicycles, $25 to $50. Easy terms. Tires $2.50; Frames $3; Forks $3; Tanks $5; Wheels $4; Chains $2; Saddles $5; Handle Bars $5; Engines $15; Motorcycle Tires $2.50; Truck Tires $7; Airplane Engines $15; Bicycle Tires $1.25. Send 50c for catalog. Price Cutter Deninger, Rochester, N. Y.

SLASHING Price Reduction! Fine Harley-Davidson motorcycle bargains. New, used and rebuilt motorcycles, $50.00 and up. Send for our new free bargain bulletin just off the press. Knuth's Harley-Davidson Agency, 2525 Fond du Lac Ave., Milwaukee, Wis. Exclusive Harley-Davidson Distributors.

BARGAINS in used motorcycle parts for all makes. No Catalogs. J. B. Dahl, 3661 Archer Ave., Chicago, Ill.

SPECIAL Low prices on latest models of renewed Harley-Davidson motorcycles. In perfect order, unconditionally guaranteed. Big bargains. Write for free list. Heinz Motor Co., 610 W. North Ave., Baltimore, Md., Harley-Davidson Distributors.

USED Motorcycle bargains. All makes. Lowest prices. Guaranteed. Shipped on approval. New easy payment plan. Motorcycle parts—supplies. Catalog free. Floyd Clymer, "Largest Motorcycle Dealer in the West," Denver, Colo.

BICYCLES $10. Tandems, reducing, exercising machines. Tricycle delivery. 175 W. Lake, Chicago.

AVIATION

FLYING Instruction by air mail pilots—the finest and most experienced flyers in the world. Col. Lindbergh was our chief air mail pilot and instructor. With such instruction, this school has operated over 9 years without an accident, graduating over 500 students. Our course and our equipment are of the very best and strictly modern. Average student flies by himself in two weeks, but we guarantee to solo you regardless of time required. No charge for breakage. First-class flyers are in great demand. Enroll now in one of the oldest and best known flying schools in America. Send 25c for helpful new book, "Making Good in Aviation." Write Dept. 0, Robertson Flying Services, Lambert-St. Louis Field, Anglum, St. Louis County, Mo.

HOME Study aviation course at new low price. Thorough, complete, including motors, wings, fuselage, bracings, assembly construction, design drawings, nomenclature, flying, flight principles, air rules, meteorology, navigation, and 50 other subjects. Endorsed by experts. Pioneer school. Diploma given. Free employment service. Write today for details. National Aviation Training, Dept. 1, 1031 So. Broadway, Los Angles, Calif.

GET Into flying now—learn at America's finest aviation school in Chicago—the center of air activity—on the finest field in the middle west—where the air mail lands. We give you complete instruction in our big downtown factory—you actually work on motors and ships. You fly at our airport in brand new ships with licensed instructors. No limit to your flying time. Write for our big free book "How to Fly." Free to you for the asking. Chicago Aviation Company, 735 S. Clark St., Chicago, Ill.

AIRPLANES. Motors and aircraft supplies; 2 cyl. 28 hp. Lawrence, $150.00; 9 cyl. 130 hp. Clerget rotary, $150.00; Suede leather helmet, $3.00 White helmet, $2.50; nonshatterable wide-vision goggles, $4.00, or oval goggle, $2.25; flying suit, white or khaki with zippers, $8.00; gold wings with vertical propeller for coat lapel, $1.00. Logan Aircraft, 716 W. Superior, Cleveland.

MODERN Aircraft—New book describing fully all latest developments in newest planes and engines used in recent trans-oceanic flights. Just what every student of flying needs. Covers every phase of aeronautical science. 855 pages. Over 500 illus. Pay postman $5 and postage when he delivers the book. Popular Mechanics Press, Room 807, 200 E. Ontario st., Chicago, Ill.

STUDY Aviation at home. Complete course by army, navy and civilian experts in the Air Capital of the West. Low price. Easy terms. Pacific Technical University, San Diego, Calif.

FLYERS, Students: Get our ground course in aviation. Shows how to figure wing areas, horsepower, speed, etc. Also a treatise on flying, postpaid 25c coin. Dix Engineering, Dept. B, Box 302, Allentown, Pa.

PIERCE'S Library—Dictionary of Aviation, $3.90. French-English Dictionary Aviation 61c. Languages Publishing Company, 15 West 18th Street, New York.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

EAGLE Airport school of aviation, Hinckley, Ill. Offers complete aeronautical courses in all its branches. Price for course, fifteen hour at $250. Qualifying you for limited commercial pilot's license for $750. Hourly instructions $20 per hour.

BUILD The Heath Parasol Monoplane for $188.00. Large illustrated folder 10c. Heath Airplane Co., Inc., 1727 Sedgwick St., Chicago.

MOTORCYCLE Engines and supplies for speedy aero-drive boats. Send dime for literature. Sensenich Bros., Lititz, Pa.

AVIATION For Everybody. Coming rapidly. New book, just issued, suitable for beginners, young people, students of flying, etc., who want something non-technical to teach them the control systems and methods of flying all types of land and sea flying machines. Strictly up-to-date. 256 pages. Illustrated. Price $2.00. Sent C. O. D., if preferred. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

BUILD And fly your own monoplane, 20-foot wing spread, 72 MPH with only 12 hp. motor. Plans and working drawings complete, $10.00. Warner Co., 311 Edwards Bldg., Cincinnati, Ohio.

FOR Sale—Three airplanes with good Curtiss OX 5 motors. All planes less than a year old. New production. In excellent condition. Will demonstrate. Cameron Aviation Co., 1909 Dorr St., Toledo, Ohio.

BECOME An expert glider. The most fascinating sport. Send quarter for details. P. Schroeter, 445 Milwaukee St., Milwaukee, Wis.

BUILD Our wonderful one place monoplane, adapted to motorcycle or other air-cooled motors to 35 hp. Detailed blueprints $1.50. Hawley Aircraft, 3366 Grim, San Diego, Calif.

HOW To speed up motorcycle engine for light plane use. Booklet with six blueprints including propeller information. Price $2.00. Hodgdon, 324 Bay, Springfield, Mass.

NEW Nine-cylinder Gnome aeroplane engine $85. Albert Latshaw, Clarion, Mich.

BUILD Model airplanes that fly. Our 52 page catalog illustrates 26 flying and exhibition models. Most complete line of accessories and supplies. Send 10 cents for our big catalog. U. S. Model Aircraft Corporation, 341 Monroe St., Brooklyn, N. Y.

"SKYWARD Ho!" New book by Derek White on your future in aviation. Opens road to career, fame, fortune. Sent free. Write at once. Parks Air College, 213 Missouri Theatre Bldg., St. Louis, Mo.

THE American School of Aviation announces a new correspondence course in Mechanics of Aviation. A thorough training in Practical Aeronautics. American School of Aviation, Dept. 1871, 3601 Michigan Ave., Chicago, Ill.

JUST Out—Book and blue prints on design, construction of small sport plane. Dependable information on motors to use, etc. Includes flying lessons and weather map reading. All for one dollar. Chas. Russell, 545 Stadium Drive, Ft. Wayne, Ind.

NEW! Three models in one. Perfect scientific reproductions. Catalog free. Stewart Marshall, Rome, Ga.

"AERODRIVE" Propeller boat attachment blueprints, 50c. Propellers, 4', $8.75; 5', $13.25; 6', $16.50; others proportionately. Leather helmets, $1.50; goggles, $3.00. Ostergaard Aircraft, 4309 N. Narragansett, Chicago.

BUNDLE Of model aeroplane material. Various sizes wood, reeds, bamboo, rubber band. Also circulars on free three-foot plane. All for dime (coin). Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

SCALE Model Airplanes ready to fly—all types. Send dime (3 for 25c) for Flying Glider and catalog. The Clinton Toy Co., Box 141, North Haven, Conn.

BIGGEST. Best Catalog Model Airplanes, Parts, Supplies; 5c postpaid. Ideal Company, 19 West 18th Street, New York.

PARACHUTES. Specify weight. Thomson Bros. Balloon Co., Aurora, Ill. Established 1903.

SIMPLEX Air Model Co., Auburn, Mass. Send five cents for supply booklet.

BOOKS AND PERIODICALS

OUT Of date. Owing to the rapid advances in the radio science, a text or reference book on radio gets out of date unless revised every few months. We never have over 10,000 copies printed to an edition in order that we may issue a new and revised edition every few months, and keep our publication right up to date. The 4th edition of "Radio Theory and Operating," by Mary Texanna Loomis, is just off press, thoroughly revised with much new material never before published; contains nearly 900 pages and over 700 illustrations. The author is lecturer on radio in Loomis Radio College, member Institute of Radio Engineers, and her long experience in handling radio makes her well fitted to know the needs of the radio student, engineer, amateur or fan. This book is used by practically all the leading radio schools of this country and Canada, universities, colleges and high schools, and all government radio schools. For sale by nearly all bookdealers, or sent direct by the publishers. Price $3.50, postage paid. Loomis Publishing Company, Dept. 18, Washington, D. C.

BLACK Art; mock trials; astrology; ventriloquism, wizards' manual; hypnotism. Your choice 30c. Smith's Novelty, M7, 137 So. Racine Ave., Chicago.

"FUN-Magic-Mystery. New book explains tricks with cards, coins, handkerchiefs, etc., you can do. Amaze your friends! It's easy. Postpaid 10c. Lyle Douglas, Station A-5, Dallas, Tex.

BOOKS, Magazines, art publications in French, Spanish, English. Photo novelties, etc., samples, lists, 20 cents stamps. Villaverde Co., Dept. 207, Box 1329, Havana, Cuba.

INDUSTRIAL Alcohol. Wright's book. Full directions for making, fully illustrated. $2.50. Spon & Chamberlain, 120 P.M. Liberty Street, New York, N. Y.

MAGIC TRICKS, BOOKS AND JOKER NOVELTIES

MAGIC—Tricks, Books and Supplies. For amateurs as well as the great professionals. Anyone can learn through our instructions. Feature Acts in Mind-Reading, Spiritualism, Rope Ties, etc. Large illustrated professional catalog, 20c. Chicago Magic Co., 140 So. Dearborn St., Dept. B, Chicago, Ill.

AMAZE And Mystify! New 1928 "Fun-Magic-Mystery," profusely illustrated; explains many tricks. Also catalogs 750 Tricks—Illusions—Jokes—Puzzles—Books—Imported novelties at reduced prices. Postpaid 10c. Lyle Douglas, Station A-5, Dallas, Tex.

JOKER Novelties. Sample 10c. Lists 2c. Bloom, 5317 West Boulevard, Vancouver, Can.

MAGIC Catalog 20c. Free trick. Lynn's, 105 Beach, Jersey City, N. J.

HOW To do 153 tricks and catalog, 10c. American Specialty Co., Swampscott, Mass.

MAGICAL Surprise package, 25c. Chelsea, Station R, Box 24-M, New York City.

25 MARVELOUS Magician's secrets, including disappearing lady; floating head mystery; astounding mind tricks. 30c (coin). Smith's Novelty, M7, 137 So. Racine Ave., Chicago.

WANTED: Novelties, games, tricks, etc.; 5c, 10c, to $1.00 varieties. Send catalogs, samples. Regent Novelty House, 2117 Regent Pl., Brooklyn, N. Y.

INVISIBLE Ink, 25c coin. E. Adlard, 21 East 13th St., Brooklyn, N. Y.

CARD Tricks, coin tricks, hypnotism, ventriloquism. Instructive 64-page books 10c each. Geo. Fenner, 2401 Jefferson, Louisville, Ky.

FREE with $25 order die box. Send 20c for our large catalogue of tricks, wigs, sensational escapes. Oaks Magical Co., Dept. 548, Oshkosh, Wis.

SEVEN Magical Delusions and Catalogs—25c. Gilmagico, Morgan Park, Ill.

ELECTRIC Fun! Seventy stunts, 110 volts, $1. Cooper Sons, Campbell, Calif.

GAMES, ENTERTAINMENTS AND PLAYS

PUNCH And Judy, ventriloquism, imitations learned by mail. Information 2c stamp. Scott, 719 First, New Orleans, La.

LEARN Ventriloquism by mail—small cost. 2c stamp brings particulars. Geo. W. Smith, Room S-288, 125 N. Jefferson St., Peoria, Ill.

250 CLEVER Entertainments; 360 snappy toasts; 100 new Ford jokes. Postpaid 30c (coin). Smith's Novelty, M7, 137 So. Racine Av., Chicago.

SURPRISE Trick-Joke novelties for all occasions. 100-page catalog 10c. Lyle Douglas, Station A-5, Dallas, Tex.

NOVELTIES, CURIOS, ETC.

EUROPEAN Novelties, Puzzles, Funmakers. 100 page catalog 10c. Lyle Douglas, Station A-5, Dallas, Tex.

STAMP COLLECTING

500 DIFFERENT Stamps for 25c! Big collection 500 different stamps from Bosnia-Herzegovina, Crete, Epirus, Hong Kong, Iceland, Kenya and Uganda, Liberia, Malta, Nyassa, North Borneo, Orange River Colony, Siam, Wallis and Futana, and other "hard" countries. Catalog value $10.00. Price only 25c to approval applicants! Special bargains, 1,000 different 79c; 15 triangle stamps 49c; 100 Africa 45c; 100 Asia 50c; 100 Balkan States 35c; 100 British Colonies 25c; 100 French Colonies 30c; 100 Portugese Colonies 50c. All 8 packets for $3.00! Illustrated lists free. Loma Stamp Co., 3926 32nd St., San Diego, Calif.

MYSTIC "Queer Country" Packet! Contains scarce stamps from the following strange lands: San Marino, Antioquia, Congo, Cyprus, Fiji Islands, Gwalior Hyderabad, Iceland, Jhind, Kenya, Uganda, Lebanon, Monaco, North Borneo, Nyassa, St. Thomas Prince, Eastern Roumelia, Siam, Sierra Leone, Tanganyika, Trinidad Tobago, Ubangi, Upper Volta, Wallis Futuna, Alaouites. Get this wonderful packet of "freak countries" and make your friends envious! Price only 10c to approval applicants! Write today. Mystic Stamp Company (Dept. 8), Camden, N. Y.

$1.00 FREE. Black U. S. Postage, Given Away with each order. Pioneer Stamp Album with 500 illustrations. 150 different stamps from 40 countries, Syria, Lebanon, Hejaz, Liberia, New French Colonies, British, Portuguese Colonies, South Africa, Australia, 500 hinges, 36 page illustrated catalogue. All for 15c. Big Commission to Agents for the Best approval sheets of stamps ever offered. Write for sample outfit. Hussman Stamp Co., Dept. M, 620 Olive St., St. Louis, Mo.

ANCHERS $$$ Outfit—only 12c! Fine triangle stamp; set German stamps with (pre-war) value forty million dollars (interesting!); perforation gauge, mme scale; small album; airmail set; scarce stamp from smallest republic on earth; newspaper set; packet good stamps from Travancore, Malay, Dutch Indies, etc. Entire outfit for 12c to approval applicants! (Nice pocket stock book, value 25c, with every order!) Ancher Stamp Co., 148½ Clerk St., Jersey City, N. J.

100 DIFFERENT Foreign stamps from 100 different foreign countries, including Africa, Asia, Australia, Europe, West Indies, etc., for only 20c. Free with each order, our pamphlet which tells "How to Make a Stamp Collection Properly," together with our price lists of albums, supplies, and hundreds of bargains in sets, packets, etc. Queen City Stamp & Coin Co., Room 36, 604 Race St., Cincinnati, Ohio.

ONE-CENT Approvals. Fine fillers, big bargains. State countries desired. George Ludlum, Box 123, Seattle, Wash.

LINDBERGH Panama issue complete, 40c. 10 sets $3.00. Wirth, 139 Shepherd Ave., Brooklyn, N. Y.

UNITED States—26 different, 5c to buyers from 50% or 60% discount sheets. State size of collection. Leduc, Redlion, Penna.

THE Floping stamp—just out. It's a Wow! Agents wanted. Sample and terms 25c. We buy and sell stamps. Howard & Howard, 22 East 4th St., Newport, Ky.

110 DIFFERENT Stamps cataloging $4 only 10c. Approvals. Smith, 7000 Clyde, Chicago.

CANADA: 30 Varieties 15c postpaid. Lists free. Allion, Angola, Ind.

ALBUM, 1,000 Hinges, 200 foreign, 25 Cuba, 25 Japan, 35c. Burtiss Company, Saratoga, N. Y.

THE Mystery Packet contains 60 diff. stamps from the lands of cannibals, heathens and wild savages. Included are Congo, Travancore, Kenya and Uganda, Ubangui, Siam, etc. Only 8c to approval applicants. Dennie, 7763 Logan, Detroit, Mich.

VALLEY Forge first day covers 20c. Six different cities and mint block four, $1.00. Sesqui, White Plains, Bennington, Burgoyne, 20c. Ericsson 25c. First day cover new air mail stamp. August 1st, 20c. Howard M. Weaver, Waynesboro, Pa.

FREE 50 British Colonials, if approvals requested. Postage 4c. Berkeley Stamp Co., South Berkeley, Calif.

FREE, 12 Diff. British Colonies for a request for my popular approvals of large showy picture stamps, at 50% disct. Postage 2c. Chas. Bushnell, 4728 Princeton Ave., Tacony, Phila., Pa.

QUALITY Approvals, 50% discount. Ref. O. K. Stamp Co., Box 581, Utica, N. Y.

FINEST Approvals 50% discount. Reference required. Premium with every purchase. Ioor, 802 State Life Bldg., Indianapolis.

BEST One-cent approvals in America. Forest P. Hand, 1117 So. 60th St., Philadelphia, Pa.

SETS—10c Each! Algeria, Carinthia, Cilicia, Crete, Ecuador, Grenada, Kenya, Palestine, Paraguay, Rhodesia, Saar. All eleven for $1.00. Illustrated list free. Approvals. Eastern Stamp Co., 1809 Kilbourne Place, NW., Washington, D. C.

APPROVALS 1-10 Cent up. Jerome Atwood, 3831 Cliff Road, Birmingham, Ala.

200-200-200-200—ALL Different stamps; 200 hinges, approval sheet to hold 200 stamps; perforation gauge, millimeter scale and ruler; duplicate stamp container—all for only 15c to approval applicants. Edgewood Stamp Company, Milford, Conn.

NEWFOUNDLAND Postage stamps. 40 standard varieties $1.00. 16-page catalog free. Rev. Butler, St. Georges, Newfoundland.

100 FINE All different stamps. 2 nickel coin, 3 crisp notes and catalog 10c. George Best, Cedar Rapids, Iowa.

105 CHINA, Etc., 2c. Album (500 illustrations) 3c. Bullard, Sta. BB, Boston.

FREE: Two sets stamps. Approvals. Bullock Arlington, Hazleton, Pa.

BOYS: 75 Stamps, Mexico, Japan, etc., 2c to approval applicants. H. Hunziker, Jordan, Minn.

IF Willing to spend $2.00 up. Try our approval books of 500 different references required. Farley Stamp Company, Auburndale, Mass.

FINE Approvals with premium to applicants. Bermuda and Barbadoes. Robert Thorndike, Montrose, N. Y.

ANNIVERSARY Offer! 15c six beautiful sets: "Ocupation," "Commemorative," "Airmail," "Charity," "Pictorial," "War." Also three packets: (International), (British) French, Portugese Colonies), (Bulgaria). Approvals, lists, discounts. Deering, Fairmount, Marlborough, Mass.

110 DIFFERENT Stamps, many unused, high values, free to collectors requesting our Net Approvals. Postage 2 cents. Christensen, Milwaukee, Wis.

ONLY 5c! 10 Airmail stamps, including scarce Esthonia triangle; Greece Red Cross set; packet fifty different stamps—all unused—from Guyane, Ubangi, etc. All for 5c! Approvals and free lists with each order. Curhan Stamp Company, Gloucester, Mass.

STAMPS, 100 all different. Postage 2c. Lists free. P. M. Quaker Stamp Co., Toledo, Ohio.

REVENUES—Telegraphs—Every country. Pretty—Intriguing—Cheap. Mint $5.00 revenue free to applicants with references. Vanderhoof, 1114 Logan, Denver, Colo.

HIGH-CLASS Approvals. References Required. Pikes Peak Stamp Co., Colorado Springs, Colo.

STAMPS, 100, all different, 3c to approval applicants. Glenn R. Knight, Box 3, Sausalito, Calif.

STAMPS sent on approval at 70% discount. Reference required. Emory Renoll, Hanover, Pa.

BEAUTIFUL Picture Stamps Sent Free. Paul Cornish, Schenectady, N. Y.

110 NEW Europe All Different, a wonderful collection cataloguing several dollars, free to collectors requesting our Net Approvals. Postage 2 cents. Badger Stamp Co., Milwaukee, Wis.

STAMP Collecting Hints. This booklet free to beginners. T. E. Bottome, 2934 Shriver, Indianapolis, Ind.

MOST Sensational values; over 140 diff. Algeria, Airplanes, Azerbaijan, Barbadoes, Cameroun, Babon, Guyane, Irish set, large French Colony packet, largest stamp, 40 year old U. S., gauge, etc., for 10c to approval applicants. List free. 100 diff. U. S. 30c—1,000 hinges 9c—50 Bavaria 9c. Hawkeye Stamp Co., Cedar Rapids, 39, Iowa.

101 DIFFERENT Free with 50% Approvals, 2c postage. Noemus Stamp Co., 312 East 23rd St., New York.

UNITED States and Canadian 32-page price list free. Stamps bought. Stanley Gibbons, Inc., 38p Park Row, New York City.

600 DIFFERENT $.50, 1,100 $1.00. Fred Onken, 630 79th St., Brooklyn.

40 DIFFERENT United States 10c. 60% approvals. Seidenberg, Baroda, Mich.

FINEST One Cent Approvals in the United States. Stanton, Niantic, Conn.

FREE, 12 Diff. large, showy picture stamps for a request for my popular approvals. Postage 2c. Premiums with every purchase. A. Bauer, Palmyra, N. J.

200 DIFFERENT stamps 10c; 1,000 Hinges 10c. R. H. Carlton, 380 W. So. Temple, Salt Lake, Utah.

COVERTCO Packet, 100 different stamps 10 cents, with 60% discount approvals. Covert Stamp, 39 State, Rochester, N. Y.

1,000 VARIETIES For 69c! Approvals. Kenmore Stamp Co., 703 Kenmore Place, Brooklyn, N. Y.

THOUSAND Foreign stamps 50c; twenty foreign coins $1. Prof. McCreery, Chatham, Ontario.

PENNY Approvals that Satisfy. Neil Gronberg, Box 5441, Philadelphia, Pa.

FREE Germany air mail (5 var.) for new applicant of my 1, 2c and 3c approvals and also my 50% discount. Chas. W. Schmidt, P. O. Box 4832, Frankford Sta., Philadelphia, Pa.

LINDBERGH Cuba airmail stamp unused, only 10c. Skillman, Titusville, N. J.

FREE! 115 Different stamps to approval applicants, 2c postage. Paige Stamp Co., Oak Park, Ill.

500 MIXED U. S., old and new, 10c. Weatherby, Box 2628, Lakewood, Ohio.

100 FOREIGN Stamps 3 cents. Lufbery Route 3, North Branford, Conn.

FRENCH Colonies free—Jungles, Tigers, Native Chief. 2c postage. Empire Stamp Co., Toronto, Canada.

STAMPS, 100 varieties, Africa, Brazil, Peru, Cuba, Mexico, etc., 10c; 25 different U. S. 25c; 1,000 mixed, 40c; 1,000 hinges, 15c. List free. C. Stegman, 5941 Cote Brilliante, St. Louis, Mo.

24 VARIETIES Cuban stamps, 10 cents. List of 6,000 low-priced stamps free. Address Chambers Stamp Co., 111P, Nassau St., New York City, N. Y.

RARE COINS

40 Old Coins all different $1.00; 200 diffrent coins, $5.00; 12 dates large cents, $1.00; gold dollar, fine, $2.50; Mexico two-peso gold, $1.25. Claud Denney, Box 315, Dallas, Tex.

100 ASSORTED Foreign coins, $1.00. Oddehon, Box 681, Kansas City, Mo.

$2 TO $500 Each Paid for hundreds of old and odd coins. Keep all old money, it may be very valuable. Send 10 cents for illustrated coin value book, 4x6. Get posted. Guaranteed prices. We buy and sell. Clarke Coin Office, LeRoy, N. Y.

OLD Money Wanted. Will pay fifty dollars for nickel of 1913 with Liberty head (no Buffalo). We pay cash premiums for all rare coins. Send 4c for large coin folder. May mean much profit to you. Numismatic Co., Dept. H, Fort Worth, Tex.

UNITED STATES and Foreign Money; Military Decorations Catalogue and Greek coin 10c. Alexis Mengelle, Colorado Springs, Colo.

AMERICAN Coins bought, sold. Coin value booklet 12c. Frank Saco, 735 45th St., Brooklyn, N. Y.

GET Profit and pleasure in collecting old coins. Send 10c for large illustrated coin catalogue. You'll be delighted with it. Send for it right now. B. Max Mehl, Numismatist, Mehl Bldg., Dept. P, Forth Worth, Tex. Largest Rare Coin Firm in the U. S.

UNITED STATES, Large cent, two-cent bronze, three-cent nickel and Bargain List, 25c. Fifteen dates large cents, $1.00. George Coffin, Greenwood Mountain, Me.

4 DIFFERENT Foreign notes, 3 different nickel, silver coin and catalog 10c. George Best, Cedar Rapids, Iowa.

OLD Coins, large Fall selling catalog of coins for sale free to collectors only. Catalog quoting prices paid for coins, ten cents. William Hesslein, 101A Tremont St., Boston, Mass.

OLD Coins—Valuable information on coins of ancient and modern Europe, British Colonies and the U. S. contained in illustrated book "Chats on Old Coins" by F. W. Burgess. Pay postman $4 and postage when he delivers it. Popular Mechanics Co., Room 807, 200 E. Ontario St., Chicago, Ill.

COINS. Bills, catalog, two war coins, 10c. Wacker, Minster, Ohio.

FOR BOYS

AMAZE And mystify! Fool your friends—earn money giving shows. Easily learned. Big book. "Fun-Magic-Mystery" tells how. Postpaid 10c. Lyle Douglas, Station A-5, Dallas, Tex.

CAMERAS AND PHOTO SUPPLIES

PHOTOGRAPHIC Equipment and accessories of every description are listed and illustrated in our 228-page catalog. It will pay you to secure a copy which is issued free, as our prices are low. We also deal in used goods which are sold under the same guarantee as new goods. Ask for our Bargain Book. Central Camera Co., Dept. E132, 112 S. Wabash Ave., Chicago, Ill.

WATCH Camera "Every tick a picture." Complete camera finder film $4.00. Expo Dollar Camera, 8 vest pocket size pictures, $1.00 post paid. Imported cameras all sizes and kinds; write us your wants and save money. G. Gennert, Inc., 24 East 13th St., New York.

MAKE money in photography. Learn quickly at home. Spare or full time. New Plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3431, 3601 Michigan Avenue, Chicago.

EARN big money with your camera in your spare time, using Halldorson Home Portrait Lamp. Write for booklet "Home Portrait Photography" and catalog—both free. The Halldorson Company, 4747 N. Western Ave., Chicago.

ROLL Developed—Six prints, one beautifully tinted. 25c. 8x10 enlargement, 30c. Falls Foto Finishers, Dept. A, Glens Falls, N. Y.

HAVE You a Camera? Write for Free sample of our big magazine, showing how to make better pictures and earn money American Photography, 116 Camera House, Boston, 17, Mass.

FILMS Developed. Special Trial Offer. Any Size Kodak film developed 5c, prints 3c each. Trial 6x10 Enlargement in handsome folder 40c. Overnight Service. Roanoke Photo Finishing Co., 209 Bell Ave., Roanoke, Va.

SAMPLE Enlargement—dime, and negative (returned). Trial roll, glossy prints, 25c silver. Brown, Warsaw, N. C.

$50.00 FOR Photographs—This price paid for photographs if they meet our requirements. Perhaps one of your pictures will bring this amount. For particulars, address Redkrafts, Dept. 11, Denver, Colorado.

611 PICTURES From $4 camera brought $2,126.84! Complete plan $1.00. Dale Van Horn, Lincoln, Nebr.

QUALITY Enlargements; the Hobby Shop, Six, Traffic Station, Minneapolis, Minn.

MOTION PICTURES

FOR Sale: Moving picture films, features comedies, serials. One dollar per reel and up. Progressive Pictures,3320 Lindell, St. Louis, Mo.

WANTED To buy—Second-hand Power's, Simplex and Motiograph machines. Also extra mechanisms and stands. Must be bargains. P. O. Box 202, Birmingham, Ala.

NEW $150 Spring movie camera, $37.50; 35mm film, 2½c foot; Filmo Camera $100; Cine Kodak 16mm camera, $50; 16mm, 100 ft. negative film, $4.50 postpaid; 100 ft. complete 16mm comedy, western travel, or war reel, $4.50. Cameras, projectors and films bought and exchanged. New twin arc movie lamps $40. 3¼x5½ Kodak, $9. Ray, 296, Fifth Ave., New York.

JUST Out! Fourth edition Motion Picture Projection by Cameron, 1,248 pages. Largest work ever published. Includes 150 pages on talking movies. Covers all known makes of projectors, including amateur. A liberal education. Yours for $6.00 postpaid anywhere in the United States. Foreign, $6.25. Circular on request. Bass Camera Company, 179 West Madison St., Chicago.

STARTLING Bargains in motion-picture cameras, projectors, apparatus. Send stamp for the 192nd issue of the Bass Bargaingram. Never in history has such startling bargains been offered in guaranteed apparatus. Write for your copy now. Remarkable motion-picture exposure meter, $2.00. Sixty-six page catalogue. Send stamp. Bass Camera Company, 179 W. Madison St., Chicago, Ill.

$1,250.00 FOR A photoplay story by an unknown writer and sold through our sales department. We revise, copyright and market. Located in the heart of the motion picture industry. We know the demand. Established 1917. Postal brings free booklet with full particulars. Universal Scenario Company, 206 Western and Santa Monica Bldg., Hollywood, Calif.

NEW and Rebuilt Projectors for Theaters, Schools, Churches, Traveling Shows. Supplies and Complete Theater Equipments. Bargain Prices. Free Catalog. Monarch Theatre Supply Co., Memphis, Tenn.

MOVIE Films, 1,000 ft. reels, $2.50 each; shipped anywhere on receipt of remittance. Particulars on request. Independent Films, 177 Golden Gate Ave., San Francisco, Calif.

LEARN Theatre management at home, as a business or vocation. Catalog N shows you how. Moving Picture Theatre Managers Institute, Inc., Elmira, N. Y.

FILMS, 100 Feet 65c. Eastin Filmads, Box 424, Galesburg, Ill.

SCENERY TO RENT

WORLD'S Most Beautiful Settings for operas, plays, minstrels. Amelia Grain, Philadelphia.

EDUCATIONAL AND INSTRUCTION

U. S. GOVERNMENT Jobs. $1,140-$3,300 year. Men-women, 18-50. Steady jobs. No "layoffs." Pleasant work. Paid vacation. Short hours. Experience usually unnecessary. Thousands appointments yearly. Full particulars with sample coaching, free. Write today sure. Franklin Institute, Dept. F-14, Rochester, N. Y.

BE A Landscape Architect—Splendid earnings, real success awaits you in this uncrowded profession. We train you by correspondence. Personal guidance by noted authorities, helping you get started. Immediate income possible. Catalog free. Write today. National School of Landscape Design, 518 Equitable Bldg., Des Moines, Iowa.

STORY Ideas wanted for photoplays, magazines. Big demand. Accepted any form for revision, development and submission to markets. Established 1917. Free booklet gives full particulars. Universal Scenario Company, 406 Western and Santa Monica Bldg., Hollywood, Calif.

U. S. GOVERNMENT wants men. $1,700-$1,900 and up at start. Railway Mail clerk examination coming. Let our expert (former Government examiner) prepare you for this and also Rural Carrier, Post Office, Customs, Internal Revenue, and other branches. Write today for free booklet. Dept. S, Patterson School, Rochester, N. Y.

BOYS—Men: Become auto mechanics. $35.00 week. Particulars free. Franklin Institute, Dept. F-400, Rochester, N. Y.

MEN 18-45, $1,700-$2,700 Year. Railway postal clerks. City mail carriers. Common education. Particulars with sample coaching, free. Franklin Institute, Dept. F-3, Rochester, N. Y.

MAKE Money in photography. Learn quickly at home. Spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 131-B, 3601 Michigan Ave., Chicago.

LEARN Magic! Earn big money on stage or spare-time entertaining. 112 page book, "Fun-Magic-Mystery" teaches you. Postpaid 10c. Lyle Douglas, Station A-5, Dallas, Tex.

TRACE Missing People. Excellent paying work. Open to all. Write National Headquarters, 169 East 83rd Street, New York.

STUDY Mechanical dentistry and earn up to $125 per week. Learn at home in spare time to make crowns, inlays, etc. Write for information. Modern Dental Institute, 49 South Main St., Salt Lake City, Utah.

DOUBLE Entry Bookkeeping mastered in 60 hours with 8 keys; guaranteed; diplomas. International Bookkeeping Institute, Dept. 8, Springfield, Mo.

ARE You willing to qualify for government position, $120-$250 month. Write, Ozment Instruction Bureau, 101, St. Louis, Mo.

LANGUAGES

PIERCE'S Library—Phonic Texts. World-Romic System: Poe's Raven, 49c postpaid; La Maison que Pierre a batie, 13c; House Jack Built, 13c; Old Mother Hubbard, 13c; Gospel According to Mark, first chapter, 25c. Languages Publishing Company, 15 West 18th Street, New York.

PIERCE'S Library—Phonic Charts. World-Romic System. Chart of Organs of Speech, 37c; Universal Alphagam, 37c; French Alphagam, 37c; Spanish Alphagam, 37c. Languages Publishing Company, 15 West 18th Street, New York.

WORLD-ROMIC System, Masterkey, 5,000 languages. Primers, $1.98; Arabic, Chinese, French, German, Italian, Japanese, Russian, Spanish. Languages Publishing Company, 15 West 18th Street, New York.

RADIO OUTFITS AND SUPPLIES

TRANSFORMERS 650 Volts, two 7½ volt windings $5.50; 550 volts and 5 $4.00 adjustable chokes, 30-150 Henry, 160MA $5.00; 20-50, 250MA $7.50. Write for complete specifications. Radio Parts Co., Orange, N. J.

IMPROVE Reflex and Crystal set reception. 2 Rollo Crystals and special Catwhiskers with instructions and hookup, $1. Radiotrician, 1741 Market St., Oakland, Calif.

BE The licensed radio doctor in your community. $7-$10 spare time evenings. Our co-operative plan secures all the work you want. Secure franchised territory. Free booklet. Co-Operative Radio Doctors, Dept. M, 131 Essex St., Salem, Mass.

DeFOREST Tubes 65c postpaid; radios $1 up. Durso, 25 Mulberry, New York City.

BUY Your B. power devices direct from factory. Send for particulars. D. L. & G. Mfg. Co., 2941 W. Lake, Dept. 11, Chicago.

RADIO Trouble Shooting—Here is the book all radio men have been waiting for. Greatest book ever published from the point of view of assisting the repairman as well as showing how the radio owner can do his own repairing. 328 Pages. Over 300 Illustrations. Flexible. Pay postman price $3 and postage when he delivers it. Popular Mechanics Co., Room 807, 200 East Ontario St., Chicago, Ill.

TRADE AND TECHNICAL SCHOOLS

WANT A foreman's job? You may be a good mechanic but if you can't read blueprints you haven't a chance. I train you quickly. Write me your trade. Carroll Rumsey, 266 Drexel Building, Philadelphia.

TELEGRAPHY—Both Morse and Wireless—taught thoroughly and quickly. Tremendous demand. Big salaries. Wonderful opportunities. Expenses low; chance to earn part. School established fifty years. Catalog free. Dodge's Institute, Fern St., Valparaiso, Ind.

OUR Commercial radio operating and junior engineering course pays our graduates $150 to $300 monthly from start. Rapid advancement. Fall term begins in September. Write for catalog of course including Extension Course. Loomis Radio College, Dept. 5-E, Washington, D. C.

BUSINESS OPPORTUNITIES

YOUR Name in directory, 10c, brings big mails from everywhere. Key to mail order success 10c. Fresh names, opportunity seekers: 100, 35c; 400, $1.00. Eureka Supplies, 624 Barnett, Kansas City, Kans.

READ The Mail Order News—America's Pioneer Mail Trade Journal. Quarter Century Old. Approximately 600 pages yearly of valuable information for beginners and established mail-order houses. Analyzes mail-order business, its opportunities. Practicable mail-order ideas, legitimate money-making schemes, instructive articles. Tells how to start, what to sell. Published monthly. Subscription $3.00 yearly. Send 25c for sample copy. None free. Mail Order News, 360 Bristol Bldg., New York.

$1 PAYS $20—I start you in world's fastest big money business. You supply salesmen and agents with new sure-fire selling specialties. Write immediately for eye-opening literature, describing guaranteed formulas, latest valuable trade processes. All lines. Small investment. Immense profits! Start anywhere. Miller, Chemist, 1706-D Jetton, Tampa, Fla.

MIRRORS Resilvered at home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating like new, brassy worn-off autoparts, reflectors, tableware, stoves, etc. Outfits furnished. Details free. Sprinkle, Plater, 127 Marion, Ind.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

MAIL Order business your opportunity. Breniser's famous hand books by expert 28 years' experience show how to start selling articles you make or buy—all or part time—small capital. Fascinating, profitable. Set eleven books, $3.25. Breniser Company, 1607 P. Sansom, Philadelphia. Sample book, 25c, pay $3 for other ten if satisfied.

MAKE Money with small mail order business of your own. New book tells how. Descriptive folder free. Reider Sales Service, Ashland, Ohio.

SELL By mail. Wonderful opportunity. National Cutlery, Sta. V, Los Angeles, Calif.

MAGICAL Demonstrators! Entertain and sell. Make money both ways. Tricks-Jokes-Puzzles, etc. Easily learned. Book "500 Tricks" and wholesale list 25c. Lyle Douglas, Station A-5, Dallas, Tex.

ARTIFICIAL Marble sanitary flooring instructions, covering wood or cement flooring ½ inch thick, fireproof, waterproof, all colors, low cost. Ornamental casting, concrete, plaster, papier-mache decorations, garden furniture, statuary, flexible molds. 18 years instructing the public; particulars and illustrations free. Chris. Mahler, Huntington, N. Y.

CHARTERS: Delaware; best, cheapest; free forms. Colonial Charter Co., Wilmington, Del.

UNPATENTED Ideas can be sold. I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 810 Baltic Building, Washington, D. C.

"SCHEMER" Subscribers; surely succeed. One reports $50,000 from one tip; another $25,000 from three Schemes; another $10,000 from one formula. Try your luck! Year, $1.00; three months, 30c. Patterson, Publisher, Alliance, Ohio.

SUPPLIES For making chipped glass house numbers and signs. Tinfoils, glass and frames. Osborne Sims, 13580 Tuller, Detroit, Mich.

START A Crispette shop. Delightful confections. Everybody likes them. Make a lot of money. Adams reports $364 profits in two days. We start you. Write, Long Eakins, 1962 High St., Springfield, Ohio. (Samples 10c.)

LOCAL Men and high school boys to apply Kromanizing liquid with brush on automobiles. Experience unnecessary. No selling. $100 per week up. State age and past employment. Kromene Corp., Dept. 138, 205 W. Wacker Drive, Chicago.

START A business of your own. Make your own cream polish for furniture, automobile, pianos, etc. Send me $2.00 and I will send you enough material to make 3 gallons. Wilson's Laboratory, 1037 North 25th St., Camden, N. J.

THE Latest, most amazing products! 200% to 500% profit! Make them yourself. Write for free, valuable literature. Scheid, Chemist, Box 1199, New Haven, Conn.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

BUSINESS Profession of your own and earn big income in service fees. See Stephenson Laboratories, display ad page 129.

MAIL-ORDER Opportunity! 500 successful, selected plans, formulas, schemes. Compiled by nationally recognized specialist. Complete course $1.00. Particulars, stamp. Finkel, 15 p Fairview, Jersey City, N. J.

NO Peddling. Start own business. Home, office. Free folder describes 27 money-making opportunities. No outfits. Elite Co., 38 Elizabeth St., New York.

A "VISCOVA" Patent Multicolor on your typewriter increases speed. No typists' eye or fatigue. Fitted instantly. State make. $1.00 (bill). Agents wanted. G. Holden, Highfield View, Chesterfield, England.

YOUR Favorite products, manufacture them yourself. Guaranteed manufacturer's formulas supplied. All lines. Latest specialties. Romig, Box 103C, Station W, New York.

RETIRED Manufacturer offers private formula with instructions for making indelible marking ink, inkthinner and liquid washing blue. No machinery. Address E. Meyer Junior, 2 High Park Blvd., Toronto, Ont., Canada.

SELL Cigars, wholesale, retail. Big profits. Write Valles, 68 East 110th, New York.

GIFT Shoppe, for pleasure and profit; one dollar brings drawings and instructions. Bryan's Shoppe, Medina, Ohio.

EXERCISING, Reducing machine store for sale. McD., 175 W. Lake, Chicago.

PATENTS, Trade marks, designs and copyrights. Parker & Snyder, Barrister Bldg., Washington, D. C.

$8.00 STARTS You! In business for yourself! See American Sales Company's ad under "Agents."

ANALYTICAL Chemist will analyze any chemical specialty; show you how to make it. Send small sample. Ask for lists of formulas for sale. C. A. Black & Co., 1140 W. 6th, Cleveland, Ohio.

TURN Your spare time into $$$$, no canvassing or investment, we start you, unlimited possibilities, detailed instructions 50c postpaid. Davis' Specialties Co., Box 131, Station A, Worcester, Mass.

YOU Can have steady work all the year round. Learn how to build artificial stonehouses. Stronger than concrete and cost only one-fifth the price of frame houses. No experience needed. Write P. Swendsen, Box 60, Juneau, Alaska.

MONEY For working capital; incoporate and sell shares in your business. 27 years organizing and raising money for businesses of merit. Terms reasonable. Prompt and confidential service. W. Harrison Cole, 507 5th Ave., Suite 510, New York.

NEW Specialized business—yet you can make $1,000 per month. Start an Auto Glass Shop, replace broken glass in cars. Accidents increasing—garages send you work. I'll tell you how to start, but reserve Milwaukee territory. Write Auto Glass Shops, 752, 53 National, Milwaukee, Wis.

A BUSINESS of Your Own Making—Sparkling Glass Name and Number plates. Checkerboards, Signs. Big book and sample free. E. Palmer, 540, Wooster, Ohio.

MECHANICS, Painters, carpenters, start furniture refinishing, painting, handyman shop on nearly nothing; winning plan brings customers quickly. John Braceland, 1439 So. Ninth, Philadelphia, Pa.

WE Start you in business, furnishing everything; men and women, $30.00 to $100,000 weekly operating our "New System Specialty Candy Factories" anywhere. Opportunity lifetime; booklet free. W. Hillyer Ragsdale, Drawer 4, East Orange, N. J.

SUCCEED With Your Own Products. Make them yourself. Formulas, Processes, Trade-Secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

LEARN the collection business. Good income, quick results. Interesting booklet, "Skillful Collecting" free. National Collectors Assn., Long St., Newark, Ohio.

MAKE Big Profits with a Fur Farm in your backyard. Chinchilla Rabbits, Muskrat, Mink. Write for facts. 252 Conrad's Ranch, Denver, Colo.

SELL By Mail. Wonderful opportunity. Particulars free. Mason, 3902 Broadway, Room 5, Chicago.

KING System Mail Order Business, sample, details free. King Company, Box 6722, Wilmington, Del.

SELL by Mail! Books, novelties, bargains! Large profits! Particulars Free! B-Elfco, 525 South Dearborn, Chicago.

ATTENTION! Establish for yourself new system real estate, brokerage and insurance agency; office at home; earn $5,000 year. Stamp free booklet. Hayes Realty Association, Cincinnati, Ohio.

I MADE $30 a Week Home. French Breadmaking. 15 years' experience; Free Booklet tells. Ashbrook 67, Marengo, Ohio.

DISTRIBUTOR For 100 store route this county; experience unnecessary; no selling, distribute and collect; should net $70.00 weekly. Peris Mfg. Co., Florin, Pa.

CHEMICAL Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 228 Gordon Ave., Syracuse, N. Y.

START A profitable business. Small capital. Particulars free. Roy Burnham, "A" Lockport, N. Y.

TELEGRAPHY

TELEGRAPHY—Both Morse and wireless—taught thoroughly and quickly. Tremendous demand. Big salaries. Wonderful opportunities. Expenses low; chance to earn part. School established fifty years. Catalog free. Dodge's Institute, H St., Valparaiso, Ind.

20TH Century Manual of Ry. and Commercial Telegraphy and Radio Telegraphy, by F. L. Meyer. Of this excellent book F. H. Tubbs, Superintendent Western Union Tel. Company, in Chicago, says: "I consider this work of distinct advantage to students of telegraphy, and am glad to recommend it." Pay postman $2.00 and postage when he delivers it. Popular Mechanics Co., Room 807, 200 E. Ontario St., Chicago.

CHEMISTRY

EXPERT Chemical analysis and consultation at low cost. Formulas and processes $1. Stenton Laboratories, 2122 Griffith St., Philadelphia, Pa.

BOOKLET Of experiments and chemical catalog 10c. George Ott, 1218 Chestnut, Reading, Penna.

YOUR Chemical problems solved and working formula or process furnished for $5.00. Write me. W. Stedman Richard, Industrial Chemist, Box 2402, Boston, Mass.

FORMULAS AND TRADE SECRETS

FORMULAS That are right chemically. Not the "stock" or book type but the kind that give your products distinction and commercial value. Manufacturing processes and ideas, chemical analysis of any product. Reasonable rates. Nielco Laboratories, Inc., 5401 Cicotte, Detroit, Mich.

LATEST Valuable trade secrets, guaranteed formulas for starting world's fastest big money business making newest sure-fire specialties. All lines, small investment. Immense profits! Write immediately for eye-opening valuable literature. Miller, Chemist, 1706-E Jetton, Tampa, Fla.

10,000 FORMULAS. A real Gold Mine of money-making ideas. Tells how to make almost everything under the sun. You can make and sell cosmetics, mucilage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, bluing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send No Money. Just write a postal for "Henley's 20th Century Book of Formulas." Pay postman postage and $4. Popular Mechanics Press, 200 E. Ontario St., Room 807, Chicago, Ill.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

FORMULAS—Any kind, $1.00 each. Guaranteed. Mark Twain Laboratory, Hannibal, Mo.

ABSOLUTELY Practical, guaranteed, money-making formulas with consultation privileges. Anything analyzed, $5.00. Write for information. Associated Chemists, Dpm, Indianapolis, Ind.

3,000 VALUABLE Formulas prepaid $1.00. National Service, 3937 Marburg, Cincinnati, Ohio.

MOTH Killer, immense demand, costs 90c gallon sells $4. Formula and information $50. German-American Chemists, 55 East Wacker, Chicago.

SUCCEED With Your Own Products. Make them yourself. Formulas, Processes, Trade-Secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

FORMULAS—170 Money makers and big illustrated catalog 20c. Ideal Book Shop, (K) Park Ridge, Ill.

CHEMICALS For all purposes. New price list and three valuable formulas 25c. Moscato, 757 E. 107th St., Brooklyn, N. Y.

15,000 FORMULAS in "Scientific American Cyclopedia of Formulas." Includes following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, mucilages, bleaching, renovating, coloring metals, dyeing, glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Send no money. Just write a postal. When postman hands you book pay $5.50 and postal charges. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

AGENTS WANTED

PRIVATE Brand toilet articles, household specialties, perfumes, soaps, extracts, etc. We pack these goods for you under your private label. With your name on the goods you get all the repeat business. Don't sell for others but build up a profitable business for yourself. Highest quality merchandise. Extremely low prices. Quick shipments on both large and small orders. Write immediately for lowest wholesale prices and complete information regarding our amazing offer. Address Supply Department, National Scientific Laboratories, 1904W Broad, Richmond, Va.

MAKE Your own medallions. New sensational invention makes wonderful profits possible in photo medallion business. Now finest medallions can be made right in your own home. No machinery necessary—no investment—we furnish all parts. Costs less than 50c each. Positively new patent—first announcement. Get in on ground floor. Experienced medallion salesmen will reap fortune quick. Wonderful chance for new salesmen. Write quick. Send 50c for sample (stamps or coin). A. K. Dale, Sales Mgr. Medallion Division, Campbell Ave. and Jackson, Chicago, Ill.

AGENTS—I'll pay your bills; give you steady income for rest of your life if you will take care of my business in your locality, full or part time. You be my partner, make $15 a day, ride in Chrysler sedan. Distribute teas, coffees, spices, extracts, things people eat. I furnish everything, world's finest super sales outfit containing 30 full sized packages low prices, big repeat business; $25,000 guarantee on quality. I go 50-50 with you. Get my amazing offer. C. W. Van de Mark, 117 Duane St., Dept. 102-H, Cincinnati, Ohio.

AGENTS, Crewmen—Make big money! Handling our Mystic "Zippo"! Splendid profit on a snappy 50c "Go-Getter" repeat article sells on 10-second demonstration! Performs while you watch it! Demonstrates value while others make claims! Greatest scientific triumph of the age! Write immediately for proposition! Karam-Smith Company, 608 Bozan St., Fort Wayne, Ind.

"RIDE AIR" Men made $375,952.00 introducing this world-beating money maker the last 2 seasons. If you are not afraid to work 2 to 4 hours a day, I'll prove that $20 a day profit will be easy for you. No selling experience necessary. Sample free, and I mean just that! No strings to this offer—not a cent now or ever for the sample and full particulars. Address C. F. Hamilton, Dept. 15-J, No. 532 W. 27th St., Los Angeles, Calif.

AGENTS $240 Month. Producers earn new Ford car. Write orders for finest line guaranteed hosiery. 126 styles, colors. Beats store prices. Silk hose for your own use free. Write for samples. Wilknit Hosiery Co., Dept. 5231, Greenfield, Ohio.

$12.00 DAILY Showing new table cloth. Looks like linen. Wash like oilcloth. No laundering. You just take orders. We deliver. Pay daily. Sample free. "Besco," 4317-NW Irving Park, Chicago.

FREE—"Guide to full pocketbook." New ideas, original business plans, money-making secrets; other valuable information. Elite Co., 38 Elizabeth St., New York.

PATENTED Window lock. Every home needs several. No obligation. Write for proposition and free sample. H-C Sales Co., 114 E. Fourth St., Springfield, Ohio.

AGENTS—Best seller; Jem Rubber Repair for tires and tubes; supersedes vulcanization at a saving of over 800 per cent; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, addresss Amazon Rubber Co., Philadelphia, Pa., Dept. 505.

SENSATIONAL New invention. Sponge holding hose nozzle. Auto washer. Works like play. You don't get wet. Retails $2.00. Agents with cars making big money and traveling. Sponge Nozzle Co., 909 Ford Bldg., Detroit, Mich.

YOUR Favorite products, manufacture them yourself. Guaranteed manufacturer's formulas supplied. All lines. Latest specialties. Romig, Box 103D, Station W, New York.

AGENTS—Sell new burglar alarm window lock. Earn big money. No experience needed. Part or full time. Write Locked-Open, 809 W. Madison, Chicago.

ADD $100 A week to your income. Wonderful new products. Needed everywere. 300% profit. Samples free. Magic Products, 332-A East 31st, Kansas City, Mo.

FREE Sample mail order and agency specialty. Flinner, 5003-O Gateway, Kansas City, Mo.

AGENTS—Make $2.00 an hour selling our remedies. Full or spare time. 100% profit. Write Elvee Company, Dept. A, 2919 W. North Ave., Baltimore, Md.

PORTRAIT Agents make more money than any other class of agents. Write for our new catalog—Portrait Enlargements, Medallions, etc. Adam J. Kroll & Co., 2543 South State St., Chicago, Ill.

AGENTS—$15 A day is easy with our wonderful new line of soaps. Biggest line on market. Highest quality. Beautiful packages. Large orders in every home. Steady repeat business. Write today for particulars. American Products Co., 1894 Monmouth, Cincinnati, Ohio.

BIG—Quick profits selling dollar wonder tool. 10 useful articles in one. Everybody buys on sight. Tenuses Corp., 130 Pearl, Dept. 4, New York.

$20.00 DAILY, Easy. Introducing amazing gasoline tonic. Every motorist buys over and over. Experience unnecessary. Amazing profits. Investigate. Darnell, 730 N. Hays, Jackson, Tenn.

WELLS cleared $620.00 in one month with "Business Guide" and free legal service. Write for free outfit. Prof. Nichols, Dept. 14, Naperville, Ill.

$25 DAILY Selling $2.85 colored raincoats. Hat free. 3 dresses $4.75. Beats all competition. Outfit of 50 numbers free. American Waterproof, G724 Roosevelt, Chicago.

DISTRICT Agency open—New, sensational $17.50 tailoring line. $3.00 profit. Guaranteed woolens. Old established house. Free outfit. Write Manager, Dept. 602, Box L, Chicago.

IF I send you a suit made in latest style from finest goods, will you wear it and show it to your friends as a sample of my sensational values? Could you use $3.00 an hour for a little spare time? If so, write at once for my wonderful new proposition. Address Sales Manager, Peoria and Adams, Dept. 902, Chicago.

$50,000 PICTURE Man Friedman made canvassing. Beginners can make $100.00 weekly with my sales talk. Experienced men make more. Free book. "Profits in Portraits" explains. Sample free. Picture Man Friedman, Dept. 8-K, 541 W. Lake, Chicago.

AGENTS: Embossed signs, biggest selection, latest colors, every merchant buys. A dime for 50c worth samples. Also Changeable signs, flashing plugs. Franklin, 3322 3rd Ave., New York.

AGENTS $240 Month. Take orders for finest line guaranteed pocket knives you ever saw. Name and address on handle or emblem of any society or fraternal order. Big demand. Territory given. Write quick. Novelty Cutlery Co., Desk 2231, Canton, Ohio.

EVERY Headache pays you profit. Millions use aspirin. Agents can make $500 month on new 5c aspirin plan. Write Chas. M. Hick, Dept. 805-L, 1018 S. Wabash Ave., Chicago.

AGENTS, Portraits, photo-pillow tops, frames, sheet pictures, medallions, photo-jewelry, soaps, perfumes, laundry tablets, food products, toilet preparations, luminous crucifixes. Catalog 200 specialties free. 30-days' credit. Jas. C. Bailey Co., Station C-8, Chicago.

FREE Sample! Latest novelty signs, biggest 1928 moneymakers. Sell on sight. 500% profit. Ever-Ready, 52-A East Ninth St., New York.

AGENTS Wanted—To sell Electric Hair Clippers. Retail at $8.75. Guaranteed. Useful in every home. The Master Appliance Co., Box 33, Racine Junction, Wis.

EASY To sell groceries, summer drinks, auto oils, paints to consumers. Our representatives make $3,000 yearly and up. No capital or experience necessary. We furnish sample case free and guarantee sales. Write Loverin & Browne, G-1602 S. State, Chicago.

CEE-DAR Kills moths, chases flies, mosquitoes, cockroaches. New form. No powder or liquid. Hangs on hook. Guaranteed. Repeater. Women buy one to six. Particulars free. Sample 10c. Cee-Dar, D77 W. Washington, Chicago.

AGENTS—Salesmen, 5 in 1 pen, pencil; latest importation in big demand; 100% profit. Write for catalog giving many other fast sellers. Globe Supply Co., 96 Fifth Ave., New York.

SELL Kepple's Products—Act as our representative in your district. The leading drug stores throughout the east buy regularly. Dentists and homes from all parts of the world buy our line. Agents receive benefit from all mail orders in each district. Write Kepple's Products Co., Wilkinsburg, Penna.

BIG Pay every day, showing Nimrod's all-year sellers! Dress, work and flannel shirts, overalls, pants, sweaters, underwear, pajamas, leather coats, lumberjacks, playsuits, etc. Experience unnecessary. Big outfit free. Nimrod Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

THE Christensen Mop Wringer rubs, scrubs, cleans the mop. For sale by H. K. Christensen, Fort Atkinson, Wis.

AGENTS: Make $3.00 an hour taking orders for our 40 fascinating kitchen specialties. No competition. Write quick. General Products Co., Dept. H-207, Newark, N. J.

BIG Commission selling my "Hook and Knot-Less" Automobile Tow Rope. Also Cowboys' Lariats. For particulars write Jess T. Olson, Somerville, N. J.

NO Peddling. Start own business. Home, office. Free folder describing 27 money-making opportunities. No outfit. Elite Co., 38 Elizabeth St., New York.

DEMONSTRATE Face creams, etc. Sample case free. Commission half. Box 492, Cincinnati, Ohio.

AGENTS $240 Month. Bonus besides. Introduce finest line silk hosiery. Guaranteed 7 months. Auto given when earned. We give you fine silk hosiery for your own use. New plan gets business fast. Samples furnished. Write quick. Betterknit Textile Co., Silk-3031, Greenfield, Ohio.

AGENTS, Men and women—Summer line ready. Raincoats, underwear, shirts, sweaters, house dresses, hosiery, playsuits. Big commission. Outfit free. May Co., Pancoe Bldg., Chicago.

AGENTS, $300 Month. Dri-Kleanit makes any car look like new. Removes mud, grease, road oil, all one operation. No soap or water used. Cleans any car for 10c. Wonderful seller. Make $5,000 year. Free demonstrating sample. American Accessories Co., Desk 3031, Cincinnati, Ohio.

LINDBERGH Coin, size $20.00 gold piece, history of Lindbergh flights. Book and medal both for 25c. Bootlegger's puzzle a Wow! 25c. Howard & Howard, 22 East 4th St., Newport, Ky.

MAKE $12 A day and liberal bonus selling Pioneer $23.50 and $33.50 all-wool tailoring. Commissions paid daily. 100 extra large cloth samples furnished. We train the inexperienced. Write Pioneer Tailoring Co., Congress and Throop, Dept. V-1117, Chicago.

AGENTS: $20 Daily! Latest patented ironing board pad and cover combination. Guaranteed. Low price. Sample for yourself free. American Braiding, GY, 329 West Monroe, Chicago.

CANVASSERS Soliciting and selling advertising spaces on hotel registers, nickel and leatherette menu holders, cigar lighters, toothpick containers and tested for accuracy thermometers, write Times Hotel Register Co., Dubuque, Iowa.

PATENTS. Time counts in applying for patents. Don't delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

ARE You interested in Art? Send 10c for particulars and catalog. Agents wanted. Tedjoe Art Supplies, 4629 Michigan, St. Louis, Mo.

AGENTS, Sell stores 5c candies specialties. Big profits. Colonial Co., 314 East 33d, New York.

AGENTS—If you need money write for free sample So Easy Mystery Polishing Cloth. Mohler, Box 453B, Chicago.

WOMEN: $2 An hour spare time; 100% commission; new idea sanitary necessity; sells on sight; every woman buys; new feature never before used; designed by physician; revolutionizes old uncomfortable methods; pay every day; no deliveries; no collections; no experience or capital required. Write Mary P. Coleman, Meriden, Conn.

$5 SALE—$5 Profit. Beat it? New combination Life-Accident Policy. Write United Underwriters, PM-1, Willow Hill, Ill.

$20 DAILY. New auto invention. Snappy metal initials installed any car 3 minutes. Low cost. 500% profit. Free particulars. Consolidated, 69-HR, W. Van Buren, Chicago.

1 AUTO Gas saver sent. To introduce. All autos. Amazing mileage increases. Critchlow, H3-805, Wheaton, Ill.

"NO Equal," the wonder toothpaste. Cleans magically. Stops aches, reduces swelling. A natural foe of bleeding gums, tartar, irritation and decay. Relieves coughs and heartburn when taken internally. Sample 50c. Credited on first order for 12. No-Equal Products Co., 4124 Lake St., Chicago, Ill.

$40.00 SUITS For $23.50! All one price. Union made of finest quality virgin wool. You don't have to know anything about selling clothing. We guarantee your success if you are honest and willing to work. Write at once. William C. Bartlett, 850 Adams, Dept. 106, Chicago.

IF We send you two of our newest inventions—Wringer and Dust Mop—will you demonstrate and take orders? Every housewife eager prospect. Pays $75 weekly. No money required—samples loaned free. Write Delphos Mop Co., 1018 Washington, Delphos, Ohio.

MAKE $50 To $75 a week. Everyone needs shoes. Sell Mason's all-leather shoes, amazingly low prices. 85 styles—Men's, women's, children's. No experience needed. Big outfit free. Mason Shoe Mfg. Co., Dept. 228, Chippewa Falls, Wis.

MY Agents earn $90 a week! Wear and show my beautiful new free raincoat and give away free hats. Write today for yours. Robert King, 230 So. Wells, Dept. AA8, Chicago.

$15 A DAY Sure. Sell guaranteed solid leather shoes. Unequaled low prices. 85 styles; men's, women's, children's. Free outfit offers complete line shoes, raincoats, leather coats, puttees. Consolidated Shoe System, Dept. 815, Eau Claire, Wis.

HOUSEHOLD Brushes, complete line; sample outfit and credit furnished to responsible men. National Fibre Broom Co., St. Louis, Mo.

STRANGE Invention! Pays $25 daily. Keeps telephone and iron cords from tangling and kinking. Prevents iron scorching. Saves electricity. Sample free. Neverknot, Dept. 8-A, 4503 Ravenswood, Chicago.

200% PROFIT—Demonstration gives you immediate sale. A 25c item that to every housewife is an absolute necessity. C. Seed Manufacturing Co., 73 Franklin St., New York City.

AGENTS—District managers! $8.88 for Men's Utility Suits! Resists sparks, snags, water! No competition! Free kit! 888 Company, Dept. HC-7, Fort Wayne, Ind.

MYSTERIOUS Fluid mends hosiery and fabrics instantly. Make $100 weekly introducing it. Free outfit to workers. New Way Laboratories, Dept. 118, Mt. Healthy, Ohio.

AGENTS Become a regular established McConnon dealer! Buy on credit; sell for cash or credit. 228 absolute household necessities; all repeaters. Enjoy a sure income 52 weeks per year, year after year, city or country trade. Capital, experience unnecessary. McConnon & Co., Dept. M908, Winona, Minn.

EXPENSIVE Silk dresses. Sacrificing showroom samples cheap. Peddlers, storekeepers, dress parlor people, write Hirschlar's, 249 West 34th, New York.

BRAND New plan—Free suit to each agent. $45 and up weekly, paid in advance. Take orders for our high-grade tailoring. Handsome carrying case outfit of large real cloth samples furnished free. Spencer Mead Company, Harrison and Throop, Dept. V-816, Chicago.

SELL Supreme No-Cement tube and tire patches. 400% profit. Particulars. Write Supreme, 135 Winder, Detroit, Mich.

MAKE $1,000 Before Christmas selling exclusive personal Christmas cards, steel engraved designs. Expensive sample book free. Wetmore, Janes and Sugden, Rochester, N. Y.

FLAVORING Extracts—Bottle yourself. Concentrated, add water! Free labels, whirlwind sellers! 500% profit! Money-making opportunity. Write Thomas Manufacturing Company, Indianapolis, Ind.

AGENTS—Quick seller. Sample free. P. M. Geiger, 6538 North Maplewood, Chicago.

MIRRORS Resilvered at home. Costs less 5 cents per square foot; you charge 75 cents. Immense profit plating autoparts, reflectors, tableware, stoves. Refinishing metalware, etc. Outfits furnished. Details free. Write Sprinkle, Plater, 128, Marion, Ind.

HANDSOME Profits supplying leading self-repeating auto necessity; no competition; pay daily; write today; best season. Topco Mfg., Dept. X, Sta. H, Cleveland, Ohio.

GET Your Lindbergh souvenir medal now. 16-page book, describing flight, free with each. Fast sellers. Particulars free. M. W. Smith-1, Millville, N. J.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

AGENTS, Salesmen, representatives, to sell men's imperfect fancy Rayon silk hose, cost 90c per dozen, $1.00, $1.10, $1.30, $1.85, $2.25; imperfect neckwear, 60c, $1.00 per dozen. Send today money order $10.00 for 8 sample dozens. No less sold. Lewis Hosiery Company, 12 N. 3rd St., Philadelphia, Pa.

AGENTS For our attractive line of printing. $20.00 daily. Commission in advance. Sample outfit to interested salesmen. Aerco Printing Service, 725 Hallett St., Bridgeport, Conn.

MAKE $11.00 Daily selling our lucky 11 toilet goods assortment at $2.25 giving free 2 piece carving set. Each sale makes steady customers. E. M. Davis, Dept. 56, 2301 Canal, Chicago.

100% PROFIT Made distributing imported oriental perfumes and cosmetics. Sample case absolutely free. Write Romola Perfumerie, Inc., Dept. L, Armour Station, Chicago.

AGENTS Wanted to handle exclusively furniture and automobile polish. No labor required to produce gloss. Sample will be sent on request and allotted and exclusive rights and territory. Krimsky & Ricker, Mfgrs., 3557 W. 22nd St., Chicago.

AGENTS—Stop ringing door bells. Place "Gitsnifes" on all store counters. Estab. steady big pay with repeat bus. Write P. G. Gits Co., 5419 W. Chicago Ave., Chicago.

DISTRICT Managers, agents, now selling direct, rubber mats and specialties; open territory. Answer quickly. Durable Rubber Co., 1140 Broadway, New York City.

BIG Sales with our chemical specialties. List and samples free. Peoples Chemical Laboratory, 2519 So. Crawford Ave., Chicago, Ill.

ANTI-GLARE Headlight attachment. Takes glare out of headlights. Makes night driving safe. Increases light efficiency. Agents wanted. Retails $1.50 per pair. Anti-Glare Attachment Co., Box 97, Sapulpa, Okla.

ARE You old at forty? See our advertisement on page 64 of this issue. The Electro Thermal Company, 2108 Morris Ave., Steubenville, Ohio.

$8.00 STARTS You! In a profitable business of your own. No more hard times! Be independent! Something new! Can be operated anywhere! Write quick for free information. American Sales Co., Box 718-A, Springfield, Ill.

AMAZING Profits showing new Polly wrench. 10 wrenches in one. Guaranteed seller at sight. Agents making $10-$25 daily! Get yours free! Gellman Mfg. Co., Dept. 6A, Rock Island, Ill.

AGENTS, Distributors: whirlwind seller; gas stations, dealers, drivers. "Miracle" windshield cloth; one wiping defies rain 24 hours; amazing results; retails 50c. Celco Chemical Co., 2225 Lawrence Ave., Toledo, Ohio.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

AUTOMOBILE Specialties. Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tujunga, Calif.

AGENTS, Our cigar lighters and salesboards sell quick. Large wholesale catalog free. Joseph Sales Company, 223 Madison St., Chicago.

$1,000.00 REWARD If this is not the greatest money-making house to house proposition ever known. N. R. G. tablets wash clothes in 10 minutes without rubbing. Free samples. N. R. G. Co., H 500 W. Division, Chicago.

$75 WEEKLY. Man or woman wanted with ambition and industry, to distribute Rawleigh's Household Products to steady users. Fine openings near you. We train and help you so you can make up to $100 a week or more. No experience necessary. Pleasant, profitable, dignified work. Write today. W. T. Rawleigh Co., Dept. 53PPM, Freeport, Ill.

THE Latest, most amazing products! 200% to 500% profit! Make them yourself. Write for free, valuable literature. Scheld, Chemist, Box 1199, New Haven, Conn.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

MAGICAL Demonstrators! Entertain and sell. Make money both ways. Tricks-Jokes-Puzzles, etc. Easily learned. Book "500 Tricks" and wholesale list 25c. Lyle Douglas, Station A-5, Dallas, Tex.

AGENTS—For Aladdin polishing cloth. Enormous demand everywhere; 200 per cent profit. Sample free. L. Dougherty, 518 West 39th St., New York.

RADIO! Big money made on amazing new invention. Simple device makes marvelous loud speaker of any piano in one minute. 10,000,000 radio set owners need this. A wonderful opportunity for quick profits. Write at once for circular and confidential price. Tunbar Radio Co., Dept. PM-26, Cortlandt St., New York City.

AGENTS—Mosco Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 412 Searle Bldg., Rochester, N. Y.

MAKE Big money. Be the electrical dealer in your town. Sell a big line of low priced, quality appliances. Write for our selling plan. Dandyline Products, 4420 N. Western Ave., Chicago, Ill.

GOLD-LEAF Window letters and script signs. No experience; 500% profit. Samples free. Meyer writes 5 days profits $141.36. Consolidated, 69-T West Van Buren, Chicago.

CAN You sell a washing machine for $9.75? Agents are making $75.00 to $300.00 weekly showing new automatic washer to housewives. Thoroughly cleans and sterilizes. No rubbing necessary. Write for protected territory. Storm Royalty Co., Inc., 3601 Enright, St. Louis, Mo.

AGENTS—Sell Trousers' Friend. Keeps trousers spick and span. Sells easily. 100% profit. Trousers Friend, Dept. 1, Box 521, San Francisco, Calif.

NO Dull times selling food. People must eat. Federal distributors make big money; $3,000 yearly and up. No capital or experience needed; guaranteed sales; unsold goods may be returned. We furnish you with sample case, license and free samples for customers—Sure repeat orders. Exclusive territory. Ask now! Federal Pure Food Co., A2307 Archer, Chicago.

SELL Gillette style razor blades. Good seller. Package 10 blades 35c; 200 blades, $3.50. J. Kramer, Iselin, N. J.

WRITE Atlas Sign Works for free working equipment. Beautiful window sign letters. Penny each! Any size. Wonderful offer to general agents. K1032 E. 55th St., Chicago.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods, Experience Unnecessary. Carnation Co., 2480, St. Louis, Mo.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

WIDESPREAD Demand for Our New Food Drink and new Flavorings (Black Walnut, Peach, Dixie Bouquet, etc.). Many other fine products. More agents needed. Blair Laboratories, Lynchburg, Va.

INSTANT Weld Welds Rubber Instantly. Stock's Profit One Day $72.25. Enormous demand. Exclusive territory. Free sample. Tourists Pride Manufacturing Co., Desk G, Minneapolis, Minn.

HERE It Is—newly invented auto necessity that goes big with new Ford; particulars free. Suburban Box 10, Mt. Washington, Ohio.

SURPRISE Housewives! Leaky utensils repaired free instantly. Knockout demonstration sells Mendets amazingly. Twelve dollars daily easy. Free samples, selling secrets. Get territory quick. Collette Mfg. Co., Dept. 7A, Amsterdam, N. Y.

"HOW To Secure Agents," a specially prepared booklet, tells of one of the most inexpensive methods in which to secure good live producing agents. It is free; write for your copy today! M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

A BUSINESS of your own—Making sparkling glass name and number plates, checkerboards signs. Big book and sample free. E. Palmer, 512, Wooster, Ohio.

32 SECONDS Complete tire change by Detmer, Ohio, with Morey Quick Action Rim Tool. Sold, singly, 49 three days, cleared $100. Anderson, Mont., sold 1,400 in 14 weeks. Get details for good territory. Harvest time now. M. Morey Rim Tool, Buffalo, N. Y.

SELL "Grip-It" screwdrivers. Holds the screw until it is started. Send 50c for sample and proposition and try it in spare time. Your profit 100%. Apex Stamping Co., Riverdale Station, Chicago, Ill.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H. Decatur, Ill.

AGENTS—Here's a New One. "Bestever Powdered Hand Soap." Sells like wildfire. Marvelous Discovery. Removes grease, paint, ink, oil, in fact anything from hands. Cannot harm skin. 150% Profit. Great Repeater. Agents simply coining money. "Free Samples Get the Business." Write immediately. Bestever Products Co., 4315W Irving Park, Chicago.

POLMET Polishing Cloth removes tarnish from metals without the use of liquid, paste or powder. Our agents say it sells like "hot cakes." Retails 25c; sample free. Gale & Co., Inc., 15 Edinboro St., Boston, Mass.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

CALIFORNIA Perfumed beads selling like hot cakes. Agents coining money. Big profits. Catalog Free. Mission Factory P, 2328 W. Pico, Los Angeles, Calif.

PHOTO Medallion Men and Women, the largest line of Photo Novelties in the world. Lowest prices, quickest service. Send for catalogue showing over 200 money makers. Photo medallions, photo medallion clocks, photo mirrors, photo fountain pens, photo powder compacts, photo jewelry and photo buttons. Gibson Photo Jewelry Co., 608-614 Gravesend Ave., Brooklyn, N. Y.

AT Last! Diamond Rival Discovered! Amazing blue white Rajah Gem astounds and deceives. Beautiful case free, $100 weekly. Rajah Diamond Company, F20, Salisbury, N. C.

SELL men's neckwear; wonderful proposition. Astor, 318-M Broadway, New York.

15c PROFIT On every 25c sale. Box 500, Shreveport, La.

$1 PAYS $20—Start the world's fastest big money making business. Make and supply agents, salesmen with new sure-fire selling specialties. Write immediately for eye-opening literature, describing guaranteed formulas, latest valuable trade processes. All lines. Small investment. Immense profits! Start anywhere. Miller, Chemist, 1706K, Jetton, Tampa, Fla.

SUCCEED With Your Own Products. Make them yourself. Formulas, Processes, Trade-Secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

FIBRE Brooms—detachable handles, fine finish. Good profits, repeat sales. The Fibre Broom People, 147-C New Jersey Ave., Brooklyn, N. Y.

REMNANT Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

NEW Unusual necessities paying phenomenal profits. Make money as you've never made it. Unequaled, amazing detailed offer, free. Concentrated Products Co., Box 3772-P, Tampa, Fla.

TIRE Agents—Car Owners. $5 to $10 allowed on old tires, free 7 day mileage test on new Mellinger heavy duty tires. 15 months guaranteed, free tire offer to agents. Make $50 weekly spare time. Write for amazing offer, powerful selling kit given agents and wholesale prices. Mellinger Tire Co., Dept. 282, Kansas City, Mo., Warren, Ohio, Oakland, Calif.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 24.

REPLATE brassy worn-off Automobile Parts, Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. $1.00 half pints. Post Paid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

$50.00 WEEKLY easy, Applying Gold initials on Automobiles. No experience needed. $1.45 profit every $1.50 job. Free samples. "Raico Monograms," X1043 Washington, Boston, Mass.

WANT Distributing Agent for Handslick, powdered hand soap; removes anything from hands; everybody a customer; sample free. Solar Products Co., J-2142 S. Troy, Chicago.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large Profits. Enormous Demand. Free Samples. Write today. Metallic Letter Co., 438-D North Clark, Chicago.

TWO Money makers for agents. "Francia" Pocket Adding Machine retails $4.85. To you $1.00. "Excellograph" Rotary Stencil Duplicator $37.50 retail. Write Typewriter Supply, 102 Hersch Bldg., Pittsburgh, Pa.

MAKE And sell your own goods. No machinery. Guaranteed formulas. Catalog free. Clover Laboratories, (E) Park Ridge, Ill.

AGENTS—Sell stores 5c candy Specialties. Lorrac Products, Albany, N. Y.

AGENTS Wanted to sell Men's Hats direct from factory. Write for catalog. Model Hat Mfg. Co., Dept. M-14, East Orange, N. J.

OUR Luminous Crucifix Shines in the Dark. Every one amazed at the wonderful effect. Easily demonstrated—easily sold. W. G. Hannan Co., 2543 So. State St., Chicago.

AGENTS—Engraved name plates, signs, numbers, etc., easily sold, profits large. Brett Bros., Roxbury Crossing, Boston, Mass.

$10 DAILY. New, highly practical, useful 50c article for every home and office. Sells on sight. Hydrawlik Corp., Roselle, N. J.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

MONOGRAM Automobiles, $1.35 Profit ten minutes' work; every owner wants them; millions without; particulars free. Motorists Accessories Co., Mansfield, Ohio.

AGENTS — Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marui Company, Tribune Bldg., New York, N. Y.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

AGENTS make $100 week furnishing Cigar Lighters to merchants on free advertising plan. Particulars sent free, write at once. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

SOMETHING New. Every motorist a buyer of our electro-magnetic-emergency Wonderlamp; takes only one minute to demonstrate and make a sale; no experience necessary; $5.00 an hour easily made; full time or evenings. Write for sample. Wonderlamp Co., 926 Fisk Bldg., Dept. 10-A, New York.

AGENTS—We start you in business and help you succeed. No capital or experience needed. Spare or full time. You can earn $50-$100 weekly. Write Madison Company, 566 Broadway, New York.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

HIGH-GRADE SALESMEN WANTED

$8.00 STARTS You! In your own business! See American Sales Company's ad under "Agents."

NEW Automotive accessory distributorship open in this territory to reliable man, mechanically inclined. Stands thorough investigation. Write Automotive Products, Inc., 2817 Lyndale South, Minneapolis, Minn.

TAILORING Salesmen wanted; owing to the tremendous demand for our sample lines we have only a few lines to place for fall. Established 39 years ago, our line needs no introduction. Largest commissions of $4.50-$5.50-$9.50 paid in advance on every sale. Satisfaction guaranteed or money refunded. 150 all wool fabrics, 6 day deliveries, hand tailoring. Write in detail today. Edward E. Strauss & Company, Dept. 104, 400-416 S. Market St., Chicago.

BIG Profits easy. Millions Christmas cards sold yearly. Demand increasing. Our $1 box 24 beautiful engraved cards and folders beats competition. 40% and more profit to agents. Also big demand for greeting cards with personal or business imprints. Large commissions. Take orders now. Write for sample box and instructions. Helen Acree Studios, 35 E. 30th St., New York, N. Y.

BIG Pay every day, showing Nimrod's all-year sellers! Dress, work and flannel shirts, overalls, pants, sweaters, underwear, pajamas, leather coats, lumberjacks, playsuits, etc. Experience unnecessary. Big outfit free. Nimrod Co., Dept. 65, 4922-28 Lincoln Ave., Chicago.

FURNACE Carburetor for any heating furnace or boiler. Eliminate 80% of smoke and soot. Reduces coal bill one-third. Easily installed and operated. We offer you a permanent business with a big profit. Give sales experience, reference and territory covered when answering. The Campbell-Hausfeld Company, Box 9, Harrison, Ohio.

1 AUTO Gas saver sent. To introduce. All autos. Amazing mileage increases. Critchlow, H1-805, Wheaton, Ill.

YOU Are wasting time working for other people. Let us show you how to control your own business and make $100 a week. Capital unnecessary immediate profits. American Products Co., 1904 Monmouth, Cincinnati, Ohio.

$100 WEEKLY Selling better-quality, all-wool, made-to-measure suits and overcoats at $23.50. Highest commissions. Extra bonus for producers. Large swatch samples free. W. Z. Gibson, Inc., 500 Throop St., Dept. V-517, Chicago.

CHRISTMAS Cards. Start early. $2.00 hourly. Spare time. 87 samples free. Windermere Press (Established 1900), 6702 Dorchester, Chicago.

$20 DAILY. New invention. Snappy metal initials installed any car 3 minutes. Low cost. 500% profit. Free particulars. Consolidated, 69-HT, W. Van Buren, Chicago.

$50 TO $75 Weekly selling new improved coveralls and service coats with customer's name embroidered on back to garages, oil stations, etc. Advertising value and unusual construction gets the big orders. We pay biggest commission. Free outfit. Am. B. Co., 329 West Monroe, Chicago.

JUST One changeable letter electric window display with moving colors and light—The Luminate. Our boys get the big money. Don't risk patent infringements—sell the original, 1928 refinements and added features make todays' Luminate irresistible. A weather-proof number for outdoor use. Join the Luminate money-makers. Display Products Company, Ltd., 405-9A, East 31st St., Kansas City, Mo.

$15-$20 DAILY Placing Shurlite lighter flints and wicks with dealers. New sales plan. Going over big. Great side line. Write quick. Fuller Co., Dept., 3, 605 Sycamore, Cincinnati, Ohio.

RELIABLE Representatives selling Silent Servant self-answering door bell. Easily sold. 100% profit. Small investment. Silent Servant, 7024 Melrose, Los Angeles.

TELLS Instantly whether leak is in valve or in tire. Cost 15c, sells for 50c. Particulars free. Sample 25c. Valve Tester Co., Elgin, Ill.

SALESMEN—Earn $100 weekly taking orders for Dazzler and Rainbow Glow electric signs. Big commissions. Exclusive territory. High grade proposition. Write Chicago Sign Sales Co., Dept. 21, Charlotte, N. C.

AMERICA'S Greatest tailoring line free. 130 large Swatch samples, all wool, tailored-to-order; union made; sensational low price. Get outfit at once. Address Dept. 607, Goodwear, 844 Adams, Chicago.

MR. BRUSH Salesmen—Old established New York brush manufacturers require services of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commission than any other brush house in the country. Write immediately for proposition. Wire Grip Sanitary Brush Corporation, 41-51 East 11th St., New York.

PUNCHBOARD Salesmen: It's easy to earn repeat commissions with the "Lincoln Line." Merchants everywhere use punchboards. Someone sells them! Why not you? Big pay every day. Catalog free. Lincoln Sales Co., 9 South Clinton, Chicago, Dept. D.

MAKE Big money—Sell our nationally known all wool tailored to individual measure suits $23.50-$29.50. Commissions $4.00-$5.00. Your big opportunity! Large sample outfit free. Write General Tailoring Co., Dept. 8, 529 S. Franklin, Chicago.

DON'T Sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

CLOTHING Salesmen: Lowest priced men's clothes of quality sold direct today. Going like hot-cakes. Only $18.50 for suit, top-coat or overcoat. Commission $4 plus bonus. New fall samples. Box 2-A, Preston Tailoring Co., Denver, Colo.

SELLING Simpson's all-wool made to measure, union label suits and overcoats at $23.50 is easy way to earn $100 a week. Big season starting. Write for exclusive territory; complete equipment, 175 samples free. J. B. Simpson, 843 Adams, Dept. 1507, Chicago.

$100 WEEKLY Easily earned selling complete line vending machines to merchants. Free selling outfit. Robbins Co., 28-F Dodworth St., Brooklyn, N. Y.

EARN $20 A day. Establish income for life selling for $1 a year $1,500 accident policy. Write W. C. Stone, 11 So. LaSalle, Chicago.

MEN—Sell dependable shrubbery, fruit trees, etc. Steady demand. Complete co-operation. Commissions paid weekly. We deliver and collect. Write Perry Nurseries, Dept. R-8, Rochester, N. Y.

BIG Season just ahead. Advertising pencils most popular every day—every business prospect. Our line repeats. Big commissions. Established in 1902. North American Pencil Works, 126 So. Clinton, Dept. 55-P, Chicago.

$18 TO $25 Daily; Biggest selling line of 2-piece suits, $9.95 and $12.50; 3-piece wool suit, $17.95 (regular $28.00 value). All-wool overcoats, $18.50. Splendid raincoats, slickers and boys' suits. Biggest commissions. Free outfits. "Jim" Foster, Inc., Dept. 28, 2250 S. Spalding Ave., Chicago, Ill.

NO Competition—New electric hot dog machine; sells $18.50; commission $6.50; ready buyers everywhere. Leonard E. Dickerson, Dept. E-2, Springfield, Mo.

SALESMEN—Trunks, bags and suitcases sell everywhere; excellent side line; commission basis. Write us today for proposition. Appomattox Trunk & Bag Co., Petersburg, Va.

PUNCHBOARD Salesmen. New fascinating game. Excitement; legal all states; $200 weekly easy; one minute sales talk; pay daily. Cigar Stores Novelty Co., Dept. A, Peoria, Ill.

SALESMEN—Become Independent. Own your business; experience unnecessary, selling our $7,500 Accidental Death; $50 Accident; $25 Sick Weekly Benefits—$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. $250,000 deposited Insurance Department. Universal Policy. Dept. A, 40 Clinton Street, Newark, N. J.

40% COMMISSION Selling printed business stationery at knockout prices. Part or full time. Free outfit. L Process Service, Minneapolis, Minn.

GOLD-LEAF Window letters and script signs. No experience; 500% profit. Samples free. Meyer writes 5 days profits $141.36. Consolidated, 69-V, West Van Buren, Chicago.

UNEMPLOYMENT, Elections, make slow collections for all merchants. Give them what they need. Not just collection system. Complete automatic credit and collection plan. Gets cash and keeps customer for merchant and for you. You get half cash on repeat orders for supplies without call-backs. Automatic income for you. 250% on original sale. Full or spare time. Judge by results! Commonwealth J Publishing Co., 508 So. Dearborn, Chicago.

WONDERFUL Free selling outfit with actual samples of Bostonian broadcloth gets quick sales for our nationally known Bostonian shirts at 3 for $6.95. Postage paid. $9.00 value; guaranteed fast colors. Liberal cash commission of $1.50 on each order of 3 shirts means big money for you. Bostonian Mfg. Co., Dept. M. 3, Boston, Mass.

$4.00 PROFIT On $5.00 sale—"Free sample." New specialty. Money getter. Every storekeeper, doctor buys quickly. Experience unnecessary. Territories open. Federal Association, Hartford, Conn.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

ALL-YEAR-ROUND Profitable busine s selling wonderful new water softener and cleaner. Removes grease, oil, ink and dirt quickly. Every home and business place a live prospect. 100% profit. Big repeat orders. Exclusive territory. Write for free sample. Seacoast Laboratories, Sea Bright, N. J.

PUNCHBOARD Salesmen. 2 hours daily, $100 every week. New line. Lowest prices. Full commission on repeat business. Catalog free. Puritan Novelty Co., 1409 Jackson, Chicago.

PUNCHBOARD Salesmen—making small towns. One sale a day nets you $105 weekly. Full commission on repeats. K&S Sales Co., 4395 Ravenswood Ave., Chicago.

SALESMEN—Four $15.00 sales to merchants net you $40.00 daily. Sayers Systems, 2813 Sheffield, Chicago, Ill.

HELP WANTED

LET Me add $30 a week to your pay without interfering with your present occupation. Interesting, pleasant work. Particulars free. Albert Mills, 1899 Monmouth, Cincinnati, Ohio.

PERMANENT Business your own; men and women, earn $35 to $100 weekly operating our original "Specialty Candy Factories." Few dollars starts you home spare time; we instruct and furnish everything. Booklet free. W. Hillyer Ragsdale, Drawer 350, East Orange, N. J.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 24.

MECHANICS, Office workers—skilled and unskilled workers—there are many good jobs open in your own town—jobs that mean big pay—quick advancement; we tell you where to find them—how to get any job you want anywhere quickly; send dollar bill for complete information and the three ways to sell ability and experience for bigger pay. Employment Manager, Box 179, South Norwalk, Conn.

ARE You old at forty? See our advertisement on page 64 of this issue. The Electro Thermal Company, 2108 Morris Ave., Steubenville, Ohio.

OBTAIN Employment! Get positions you want, quickly, anywhere. Use clever "Ways That Win." One person was offered 70 jobs! Complete methods, 50 cents. Money promptly returned if wanted. New Idea Service, Box 39-1, Station K, New York.

IMMENSE Profits making French plate mirrors; patented process; easily learned. Plans free. Wear, Excelsior Springs, Mo.

BECOME A Landscape Architect. Uncrowded profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Est. 1916. Write for details. American Landscape School, 56, Newark, N. Y.

INFORMATION

INVESTIGATING And Tracing. Work home or travel. Experience unnecessary. Write American System, 2188 Broadway, New York.

A HEALTHFUL and delicious non-alcoholic drink for everyone. Send $1.00 for complete information. Bayron, 67 E. 113th St., New York City.

MISSING Heirs—Send $1.00 and four printed or typewriten family names. Index advertisement files searched and report made at once. American Claim Agency, Masonic Temple, Francesville, Ind.

DO you like to make things? If so, you should have a copy of Popular Mechanics new book entitled "Make It Yourself." A large book of 480-pages describing how to make 900 different articles. 823 illustrations. Price $3 postpaid. A full description will be sent upon request. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

CHALK-TALK your way to popularity. Audiences at your feet if you learn how to entertain with a few simple pictures. Little artistic ability needed. "How to Chalk Talk" tells what to say and what to draw. Profusely illustrated. Make $1 and more a night. Send no money. Just order on a postal. Pay postman $1.00 and postage. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

MAILING LISTS

99% GUARANTEED Mailing lists. Accurate. Reliable. Guaranteed. The kind that produces business; compiled for every possible business or individual. Lists of every kind of any business or individuals compiled for your individual needs any where. Catalog and information on request. National List, 847 Broad, Newark, N. J.

1,000 1928 WOMEN Buyers names, $1.00. Sheasgreen, PM1427 North Penn, Minneapolis, Minn.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS, all standard makes, $10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

TYPEWRITERS—Factory Rebuilt Royals, Remingtons, Underwoods. New Royal, Remington and Corona Portables. New "Excellograph" Rotary Stencil Duplicator $37.50. Terms. Catalog Free. Pittsburgh Typewriter Supply, 945—339 Fifth Ave., Pittsburgh, Pa.

TYPEWRITERS, Motorcycles, radios $3.99 to $29.99. Knights, 1512 Locust, St, Louis, Mo.

TYPEWRITERS—All makes, $7 to $29. Fully guaranteed. Dee Typewriter Exchange, Ada, Okla.

PRINTING, ENGRAVING AND MULTIGRAPHING

100 20-LB. Hammermill bond letterheads, 8½x11, 100 6¾ envelopes to match, printed, postpaid $1.00. Coyle & Kimballs, Newport, N. Y.

1,000 MULTIGRAPHED Letters $1.75. Profitt, Box 1071R, Knoxville, Tenn.

500 20-LB. 8½x11 White bond letterheads $2.95. Write Nygoon & Company, Akron, Ohio.

HAND Lettered show cards stimulate sales and increase good will. Prices reasonable. Write John L. Thomas, Box A-86, French Lick, Ind.

500 BOND Letterheads 8½x11, 250 envelopes, $3.00 delivered. Neatness, quality. Samples. H. Curtis, 811 Harrigan, Kalamazoo, Mich.

NEARGRAVURE Processes, business stationery. Character exclusive. Samples. Sollidays, Knox, Ind.

SPECIAL: $2.95 Delivered; 1,000 printed envelopes, business cards or statements. Letterheads, $3.95. Free samples. Z. Process Service, Minneapolis, Minn.

WE print Stationery, Booklets, Catalogs, Circulars. Samples. Commercial Press, Batavia, Ohio.

250 BOND Letterheads, Envelopes, Billheads, Cards, $1.35 each. Economic Press, Leonia, N. J.

QUALITY Printing! Reasonable Prices! Send for Free Standardized samples and prices. Folders. Circulars. Catalogs our specialty. Earnest Fantus, 525 South Dearborn, Chicago.

BUSINESS Stationery. Lowest prices. Excellent workmanship. Modern type faces. Moulton Printing Company, 1410-P East 8th, Kansas City, Mo.

MULTIGRAPHING Business correspondence two dollars thousand. Hammermill letterheads, four dollars; inexpensive quality, three dollars. Miscellaneous printing. Mayera Corporation, Monmouth, Ill.

PRINTING—Stationery, circulars, booklets, publications. Superior work, prices low. Battlefield Press, Gettysburg, Penna. Free battlefield souvenir.

200 BOND Letterheads, 8½x11. 150 envelopes $2.00. 250 business cards $1.00. 500 statements $2.00. Dept. E, Hoosier Print Shop, Portland, Ind.

SAMPLES Raised letter printing with special prices free. LaClyde Service, Westfield, Mass.

200 LETTERHEADS And 100 envelopes, $1.10, postpaid. Oberman Company, Box 1268, Chicago.

PRINTING, OUTFITS AND SUPPLIES

PRINT Your own cards, stationery, circulars, paper, etc. Complete outfits, $8.85; job presses, $11, $29; rotary, $149. Print for others, big profit. All easy, rules sent. Write for catalog presses, type, paper, etc. Kelsey Company, F-11, Meriden, Conn.

COMPLETE 5-A font of 3-16 inch letters, figures, type holder, with pad and tweezers. Send only $1.00 bill for complete outfit. St. Paul Stamp Works, 74 E. 15th St., St. Paul, Minn.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalogue. Model Press, York, Penna.

DUPLICATORS AND DEVICES

YOU can make 50 to 100 copies of a letter, notice, etc., at a cost of three cents on a Heyer Quality Duplicator. Write for free trial offer. The Heyer Duplicator Co., 909 Jackson Blvd., Chicago, Ill.

RUBBER STAMPS

MUSIC Printers, rubber type. Brownie printers. Walt. Karstaedt, Dayton, Ohio.

ADDING MACHINES

NEW $3.50 Automatic Adding Machine. Adds, subtracts, multiplies, absolutely accurate. Capacity $999,999.99. Fully guaranteed. 75,000 pleased users. Makes adding easy, positive, quick. Eliminates mistakes. Saves time. Postpaid $3.50. Bassett Co., 1458W, Hollywood Ave., Chicago.

FOR THE HOME

GRANDFATHER'S Clock Works. $5.00. Build your own case; Instructions free; make good profits selling your friends. Clock works with chimes for old or new cases. Write for full particulars. Clock Co., Ruffner St., Philadelphia.

REFRIGERATING Machine, homemade. Operates successfully. Gives better service than ice. This and 328 other pratical articles in our book "Home Mechanics." Just ask for this and "Handbook for Women," containing 394 valuable household helps and pay postman 98 cents and postage for the two books. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

KITCHEN Daylight unit with enameled ceiling fixture opal glass, ready to install, $1.48. Will ship C. O. D. General Distributing Co., Duluth, Minn.

753 TIME, Labor and Money Saving Ideas for all who own, drive or repair autos. These practical kinks are based upon the actual experiences of hundreds of owners and repairmen. Three books, Auto Owners', Auto Repairman's and Auto Tourists' Handbooks, regular $1.50 value will be supplied at 98c plus the postage C. O. D. for a limited time only. Send your order today to Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago.

CEDAR chests only $11.65—"Red-i-Kut" complete with rich copper trim—you assemble and save half—send for pictures. Kuempel Furniture Company, Guttenberg, Iowa.

THAT Concrete Job. Don't be afraid to tackle it. With the instructions found in Popular Mechanics Concrete Handbook you can make 173 articles of utility and beauty ranging from ordinary steps to garden furniture. This book with our Home Mechanics Handbook that contains 329 helps about jobs that come up about the home will be sent for only 98c plus postage C. O. D. Send your order today to Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

BOATS AND LAUNCHES

MOTORS And supplies for aero-drive boats. See our ad under Aviation. Sensenich Bros.

EASY To build, speedy cove hydroplane cheaply. Make 34 miles and better with outboard motor. Redicut plans and instructions $2.00 plus postage. Pay postman when he delivers package. Illustrated descriptive matter 25c. Cove Hydro's, 548 27th Ave., Milwaukee, Wis.

FORD Engine propellers, all sizes at reduced prices; example: 14x16, $6.00. Send five stamps for catalog of marine conversion parts, and "How." Redwing Propeller Co., (Ballard) Seattle, Wash.

"MILE-A-MINUTE Thrills." Build high-speed, air-driven seaplane type speedboat using our drawings and instructions. Complete set $3.00 or illustrated folder for dime. The Airsled Company, P-12, Cedarville, Mich.

HUBBELL Marine Coolers convert Ford engines into marine motors. Booklet free. Ford speedboat, easily built, large blueprint and directions one dollar. C. C. Hubbell, Perry Ave., Norwalk, Conn.

NEW Boat Book—Revised edition of Popular Mechanics boat building book contains valuable new information on building rowboats, speed boats and portable folding boats for tourists for use with out-board motor as well as other valuable articles on canoes, motor and sailing craft of various types. In addition a valuable book on Outdoor Sports the Year 'Round. Both for $1.98. Pay postman price plus postage when he delivers package. Popular Mechanics Company, Room 807, 200 E. Ontario St., Chicago, Ill.

WATCH REPAIRING

WATCH Repairing and making shows how to clean and repair all kinds of watches. 214 page book with over 200 illustrations. Pay postman $3 and postage when he delivers book. Popular Mechanics Co., Room 807, 200 E. Ontario St., Chicago, Ill.

PRECIOUS STONES

AUSTRALIAN Opals, black opals, fire opals, cabinet specimens. List free. Norman Seward, Optician, Melbourne, Australia.

FIELD GLASSES, TELESCOPES AND MICROSCOPES

C-FAR Field Glasses $2. Consists of two rimmed lenses in neat leather case, slips into vest pocket, weighs only 1½ ounces. Gives 6 diameters magnification. Money back if not satisfied. Send $2 today to Buffalo Optical Co., Dept. PM-1, 574 Main St., Buffalo, N. Y.

ANTIQUES, WAR RELICS AND INDIAN GOODS

NAVAJO-Indian rugs and Indian handicraft sent on approval. Write Eagle Rock Indian Store, Eagle Rock, Calif.

LARGE Illustrated list curios, Indian relics, old arms, ten cents. N. Carter, Elkhorn, Wis.

SEND 5c for fine new list Indian relics, antique firearms. F. E. Ellis, Webster Groves, Missouri.

FOR SMOKERS

HOMESPUN Tobacco—Guaranteed. Chewing, 5 lbs., $1.25; 10, $2.00. Smoking, 5 lbs., $1.00; 10, $1.50. Pay when received. Farmers Union, Mayfield, Ky.

FOR MEN

YOU Need a better grip on mathematics? Tell us to send you a copy of "Mathematics for the Practical Man," only $1.50. By common sense methods it removes the mystery and difficulties so algebra and calculus are made simple. Assuming your knowledge is limited to arithmetic you quickly and easily gain a working knowledge of algebra, geometry, trigonometry and calculus. Simply pay postman when he hands you the package. Address Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

ESCAPE from Sacks, Rope Ties and Chains. Easy with these complete instructions. Give an evening's entertainment and mystify the "wise ones." Let them tie you hand and foot, place you in a bag and seal the bag. In a minute you are out. Complete instructions in "33 Rope Ties" and "Sack Escapes." Send no money. Pay postman $1.50 and postal charges for these two books. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

PHONOGRAPHS AND RECORDS

BUILD Your own phonograph. Catalog and instructions to build new type horn mailed for 10c. American Phonograph Co., 4116 West 24th Place, Chicago.

MUSIC AND MUSICAL INSTRUMENTS

WHY Pay $150.00 or more for a high-class professional model Tenor or Plectrum Banjo? These styles offered at $30.00, $36.00 or $45.00. Made by the originators of the "Regal" Tenor Guitar and Octofone. Ask your dealer or write us. Regal Musical Instrument Co., 3211 Grand Ave., Chicago.

SONGWRITERS: Submit your song or poem. Same returned immediately if not accepted. Chester Escher, 1547 Broadway, New York City.

REAL Melodies. Ed. Applegate, 1524 Monroe Ave., Neptune, N. J.

SONG Poems solicited. A different proposition. Richard Broughton, Sioux Falls, S. Dak.

OLD Masters violin, date 1789. Big belly, choice stock, sold once for $250.00, now $50.00. Address Marcus Richards, Lawrence, Mass.

SONG Poem writers, address Hibbeler, D1, 2104 N. Keystone Ave., Chicago.

SONG Writers Successful songs earn fortunes. Submit poems. Brennon, Dep. L, 1654 Bway, ,New York.

SONG-POEM Writers: Address Monarch, 236 W. 55th, Dept. 204, New York.

VIOLINS, Deep, mellow, soulful—on credit. Easy terms for wonderful instrument. Get details today. Gustav F. Henning, 302 University Building, Seattle, Wash.

SONGWRITERS, Substantial Advance royalties are paid on publishable work. Anyone having original ideas for songs may submit poems for examination and free advice. Walter Newcomer, 1674 Broadway, N. Y.

CORNETISTS—Trombonists—Saxophonists—Clarinetists. Get "Free Pointers." Name instrument. Virtuosi School, Buffalo, N. Y.

PLAY Piano by Ear. A Sound System. Booklet free. Boucher's Harmony Studio, Ottawa, Can.

SONG Poem Writers, Write Sequoia Songwriters' Service, Sherman Branch, Los Angeles, Calif.

"BANJOS" Should interest all musicians on account of the popularity of the Banjo, as it easily increases a Player's income. Illus. Catalog of 48 pages free. The Bacon Banjo Co., Inc., Groton, Conn., U. S. A.

I WANT Song Poems. Casper Nathan, 3544 N. Racine, Chicago.

"MUSIC Composed" to words. Bauer Bros. (formerly of Sousa's Band), Oshkosh, Wis.

WRITE Songs. Big money and reputation. Write for information. J. Gordon Pub. Co., 201 N. Hoyne Ave., Chicago.

FREE—"Song Writers Guide," Beaver, 1257 Elm, Green Bay, Wis.

PATENT ATTORNEYS

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

PATENTS—Write for our free book, "How to Obtain a Patent" and Record of Invention Blank. Send model or sketch of inventions for inspection and instructions free. Terms reasonable. See advertisements on pages 140 and 141. Victor J. Evans & Co., 934 Ninth, Washington, D. C.

PATENTS Procured, prompt service, personal, careful and efficient service. Highest references. Moderate fees. Send sketch or model for actual search and advice. George P. Kimmel, Master of Patent Law, 54H, Legal Bldg., Washington, D. C.

INVENTORS: Send sketch or model for advice and exact cost of patent. Ask for our Free book: "How to Obtain a Patent." Tells what every inventor should know. Established twenty-eight years. Highest references. Prompt service. Reasonable charges. Chandlee & Chandlee, 414 Seventh, Washington, D. C.

PATENTS, Trade-marks, designs and copyrights. Parker & Snyder, Barrister Bldg., Washington, D. C.

LACEY'S Patent Sense. Valuable book free. See ad page 143.

PATENTS—Write for Instructions." Carl Miller, Registered Patent Attorney (former Patent Office examiner), 211-A McGill Building, Washington, D. C.

PATENTS, Trade-marks, Copyrights. Reliable services by an experienced practitioner devoting personal attention to each case. Inquiries invited. References furnished. B. P. Fishburne, Patent Lawyer, 525-A McGill Bldg., Washington, D. C.

RICHARD E. BABCOCK, Patent Lawyer, Washington Loan & Trust Bldg., Washington, D. C. Booklet.

PATENTS Procured: Trade Marks Registered — A Comprehensive, experienced, prompt service for the protection and development of your ideas. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request. Irving L. McCathran, 200 Owen Bldg., Washington, D. C., or 41-R Park Row, New York.

LANCASTER and Allwine, 221 Ouray Bldg., Washington, D. C. "Originators of the Form Evidence of Conception." Before disclosing your invention to anyone send for blank form to be signed and witnessed. Form and patent information bulletin free.

PATENTS—Free advice. Confidential, prompt personal service of Registered Patent Attorney, former Patent Officer Examiner. Booklet. Albert Jacobs, 727 Barrister Bldg., Washington, D. C.

PATENTS, Trade-Marks, Designs. This firm has 27 years' experience and gives expert personal service at reasonable rates. We properly protect your invention. Write for free information and exact cost of procuring patent before proceeding. John B. Thomas & Co., 902 F St., N. W., Washington, D. C.

ADVICE Free! Patents procured—Reasonable—efficient Service. 25 years' experience. Chester W. Brown, Registered Patent Attorney, 510 Van Buren Street, Chicago.

PATENTS. Booklet free. Highest references. Best results. Promptness assured. Send model or drawing for preliminary examination. Watson E. Coleman, Patent Lawyer, 724 Ninth St., Washington, D. C.

PERCY S. WEBSTER, 203 Saving and Loan Building, Stockton, California. Long established organization. Patent booklet free.

"INVENTOR'S Guide" sent free; contains valuable information. Frank Ledermann, Registered Attorney-Engineer, Woolworth Building, 1712, New York.

MONROE E. MILLER, Ouray Bldg., Washington, D. C., Patent Lawyer; Mechanical, Electrical Expert. Booklet and Priority Record blank gratis.

ESTABLISHED 1864. Milo D. Stevens Company. Free Booklet. Patents, Trade-Marks, Copyrights. Offices, Monadnock Block, Chicago; Barrister Building, Washington, D. C.

INVENTORS—Write for our Guide Book, "How to Get Your Patent," and Evidence of Invention Blank. Send model or sketch of your invention for our prompt examination and instructions free. Randolph & Co., Dept. 430, Washington, D. C.

INVENTORS Having ideas to patent: Write for booklet explaining co-operative plan for handling your applications. Tells how to sell and safeguard inventions at lowest cost. Ralph Burch, Patent Lawyer, 900 F St., Washington, D. C.

SELL Your invention before patenting. Write for free particulars. W. T. Green, 801 Baltic Bldg., Washington, D. C.

UNPATENTED Ideas can be sold. I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 806 Baltic Building, Washington D. C.

INVENTIONS—Your crude ideas developed into practical form for your patent application. Model not necessary. Send rough sketch and description for estimate of cost and advice. 27 years' experience. Albert E. Dieterich, Engineer and Registered Patent Attorney, 621½ Ouray Building, Washington, D. C.

PATENTS Procured at reasonable rates with time to pay. Sales negotiated. Staff of registered attorneys and engineers. A complete service for inventors. Write for particulars. Inventors Service Bureau, Box 1648, Washington, D. C.

FOR INVENTORS

A CORPORATION With resources of over a million dollars and over thirty years' experience in the direct selling field, and now doing an international business through an organization of over one thousand men, specially trained as house to house men, will consider the marketing on an exclusive basis of patented or meritorious articles that are adapted to this method of distribution. Wonderful opportunity for patentees, or others seeking distribution through direct sellers. If you have something that you feel has real merit, send complete details to Box 509, % Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

INVENTORS—Investigate before investing in a patent. Complete advisatory, developing and manufacturing service for The Man With An Idea. (Whether idea is patented or unpatented.) Jas. S. Douglass, Jr., Licensed Professional Engineer, Canandaiga, N. Y. New York state license.

PATENTS. Time counts in applying for patents. Don't delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

LACEY'S Patent Sense. Valuable book free. See ad page 143.

INVENTIONS—Write for our free book, "How to Obtain a Patent" and Record of Invention Blank. Send model or sketch of inventions for inspection and instructions free. Terms reasonable. See advertisements on pages 140 and 141. Victor J. Evans & Co., 157 Ninth, Washington, D. C.

PATENTS Sold and leased. Long practical experience. Free literature. Williams, 716 Pacific Bldg., San Francisco, Calif.

COULD You assist worthy inventor finance meritorious invention? Then communicate with Postmaster, Franklin Springs, Ga.

WANTED—Patented medical or health device to manufacture on royalty basis. Cincinnati Automatic Machine Co., Cincinnati, Ohio.

INVENTORS Universal - Educator—contains 900 mechanical movements; 50 perpetual motions. Tells how to obtain and sell patents. Suggests new ideas. Explains how to select your attorney and avoid patent sharks. Price (revised edition) $1.00 postpaid. Albert E. Dieterich, 621 Ouray Bldg., Washington, D. C.

GET your own patents. Legal blanks, complete instructions $1. Cutting Sons, Campbell, Calif.

UNPATENTED Ideas can be sold. I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 807 Baltic Bldg., Washington, D. C.

I SELL patents. Years of experience, reputation, original methods. You need not take chances. Charles A. Scott, 773PM Garson Ave., Rochester, N. Y.

PARTNER Wanted to pay patent fee on valuable inventions. Half interest. Write Wm. J. Falk, P. O. Box 121, Hoboken, N. J.

PATENTS Prepared, filed, sold, $25. Twenty years' experience. Guaranteed. Patent Exchange, 73 S. Fifth, Cuyahoga Falls, Ohio.

IDEAS—Five brand new ideas free. May be worth big money to you. Given to purchasers of ideas, how to get them, 50c. Dunlap, Box 703, West Branch, Los Angeles, Calif.

WANTED To manufacture on royalty basis, appliances pertaining to health or surgery. Send full details. Cincinnati Automatic Machine Co., Cincinnati, Ohio.

INVENTORS—Cash in on your invention now! Don't delay the sale any longer! Send for a free copy of our specially prepared booklet, "Turn Your Patent Into Money," today! It contains helpful information for all inventors. M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

PATENTS. If you have an invention which you wish to patent you can write fully and freely to Munn & Co., for advice in regard to the best way of obtaining protection. Please send sketches, or a model of your invention and a description of the device, explaining its operation. All communications are strictly confidential. Our Hand-Book on Patents is sent free on request. This explains our methods, terms, etc., in regard to Patents, Trade Marks, Foreign Patents, etc. "Scientific American" contains Patent Office Notes, Decisions of interest to inventors and particulars of recently patented inventions. Munn & Company, Solicitors of Patents, 1523 Scientific American Building, 24 W. 40th St., New York City; 524 Scientific American Bldg., Washington, D. C.; 1313 Tower Bldg., Chicago, Ill.; 666 Hobart Bldg., San Francisco, Calif.; 521 Van Nuys Bldg., Los Angeles, Calif.

PATENTS—Write to B. P. Fishburne (a South Carolinean), Registered Patent Lawyer, 525-E McGill Bldg., Washington, D. C.

I AM in touch with hundreds of moneyed men and manufacturers who wish to buy good inventions. Write Hartley, 38 Court St., Bangor, Maine.

SELL Your invention before patenting. Write for free particulars. W. T. Greene, 802 Baltic Bldg., Washington, D. C.

PATENTS FOR SALE

ELECTRIC Hammer—Very powerful. Patented June 5, 1928. $80.00 profit each. Also practical nut lock $40,000 profit per million. John Karcevsk, 1847 Superior St., Chicago.

OUTRIGHT, Sanitary aluminum case for baby's bottle. Keeps contents at even temperature. Jessie Waller, Kimberley, B. C., Canada.

FOR Sale, tuning attachment for pipe organ pipes; tuning is adjusted to very fine degree and tuning device then locked in position, thus rendering retuning unnecessary. Silas Silvers, 14285 Vernon Highway E., Detroit, Mich.

MECHANICAL Toys, etc.: 1,632,693, 1,660,252, 1,658,667, 1,388,094. Inventor John Ruttigieg, Elgin, Ill.

ROYALTY Basis. Device that will release tractor clutch from belt-driven machine. John Kell, Arpin, Wis.

WANTED—Capitalists and manufacturers to commercialize invention: Combination electric fan for summer and winter use, nothing like it. Cheap to make and operate. Patent pending. Address O. Samminiatelli, 734 Woodford St., Toledo, Ohio.

POCKET Umbrella, patent pending. One hand operation. F. Burris, 2730 E. 51st St., Cleveland, Ohio.

PATENTED Non-stitched suspender. Also patented front buckle. A. Z., Box 132, Hoboken, N. J.

FOR Sale—U. S. 1,575,505, automatic movable headlight for automobiles. J. W. Reynolds, 1629 Franklin St., St. Louis, Mo.

OUTRIGHT Or royalty—Separable cuff link with threadedly connection. Patent pending. J. Jemillo, 2912 W. Pershing Rd., Chicago, Ill.

FOR Sale or trade—U. S. patent letters No. 1,574,967. Patented Mar. 2, 1926, plant topping machine. Will top and thin out plants when planted in rows, such as beets, cotton, etc. Will sell outright or trade for city or county property or bonds. Copy of patent on request. Joseph Hajos, 5259 Emerson Ave., St. Louis, Mo.

INFLATABLE Belt for sale. Patent applied for; a belt to be worn by swimmers which in 2 seconds wil be turned into a buoy for actual life-saving purpose, by pulling a handle. Write Wm. J. Fulk, P. O. Box 121, Hoboken, N. J.

PATENT For sale cleaning system for comforts. Sell on royalty. W. Delaney, Plainfield, Conn.

OUTRIGHT—Wire reducer that will save expenses and labor for wire manufacturers. W. A. Murphy, 33 E. Ross St., Wilkes-Barre, Pa.

OUTRIGHT Or royalty—Automatic train control device. Eliminates all danger of wrecks, etc. J. O. Skees, 4137 Monroe St., Chicago, Ill.

AUTOMATIC Dash and trouble light. A. Halin, 3233 E. 10th, Kansas City, Mo.

OUTRIGHT Or royalty. Patented centrifugal tube cleaner and anti-overheated flexible shaft (Pending). Eugene Bertone, Stevenson, Md., Balto. County.

STREET Traffic control semaphor. Something different. Patent for sale. Edwards, DeVoine Hotel, Fargo, N. Dak.

SALE Or royalty—Automatic boiler tube puller. Patent pending. Simple to manufacture. Albert E. Hand, 412 School St., Olean, N. Y.

OUTRIGHT Or royalty basis—device that generates power from the flow of a stream. John Ornell, P. O. Box 865, Philadelphia, Pa.

FOR Sale—Patent No. 1,628,867. Others pending for super-power windmill. Address Box 352, West Bend, Wis.

CANADIAN Patent for salting peanuts in the shell. Sell outright $2,500.00. H. Stanbridge, 224 Clinton St., Vancouver, B. C.

OUTRIGHT—Patented sanitary aluminum hamburger forming machine. W. Winkie, Burnett, Wis.

OUTRIGHT—Newly patented lenses for illuminating signs. Paul Schnormeier, Hubbard, Iowa.

OUTRIGHT Or royalty—Automobile shock absorber controls both upward and downward motion. Cheap to manufacture. Ferdinand Lenser, 1509 Barton St., Cincinnati, Ohio.

AUTOMATIC Shooting gallery—Toy self-setting targets; just turn crank; neat, attractive. Stamping job—have die equipment. L. McVey, Rulo, Nebr.

OUTRIGHT Or small royalty—A safe window washer seat. Only one of its kind on the market. C. Wolfe, 7041 S. Aberdeen St., Chicago.

FOR Sale or royalty—All metal scaffolding bracket, latest design. Patent No. 1,476,644. Edson B. Rex, 1460 East 116th St., Cleveland, Ohio.

TO Manufacturer, Safety Stirrup patented in Canada and United States cheap. Joseph Buron, 420 Salisipuedes St., Santa Barbara, Calif.

BATHROOM And water heater patent and business for sale. Louis A. Faust, Comfort, Tex.

WE Commercialize inventions. Communicate with us if you have patent to sell or wish to buy one. North American Finance and Development Corp., 915 15th St., N. W., Washington, D. C.

YOUR Idle patent can be turned into ready cash, quickly! One inventor sold his patent at a cost of only $3.50. Send today for a free copy of our booklet, "Turn Your Patent Into Money." M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

SURVEYING INSTRUMENTS

ALL Kinds and makes rebuilt transits and levels. Guaranteed. Real bargains. Terms if desired. Write for descriptive list M-8. Warren-Knight Co., makers of "Sterling" Surveying Instruments, 136 N. 12th St., Philadelphia, Pa.

REBUILT And guaranteed second hand transits and levels. Write for Dept. "D" bargain list. Liberal allowance made on used instruments in purchase of new ones. Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

LARGEST Stock of new and used surveying instruments in the country direct from factory. Satisfaction guaranteeed or money refunded. Also farm levels. Wissler, 619 N. Broadway, St. Louis, Mo.

MODELS AND MODEL SUPPLIES

PATENTS. Time counts in applying for patents. Don't delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

BUILD Your own ship model for $4.98. See ad on page 135.

INVENTORS—We build models. Send us your rough idea. Our master mechanics will develop it for you into a practical working model. Thirty years successful experience doing this very thing. Best shop equipment. Expert advice. Confidential service guaranteed. Bank reference furnished. Send for free booklet "The Road To Success." Crescent Tool Co., Dept. A, Cincinnati, Ohio.

WORKING Models built. Drawings prepared free. Let our designing and engineering department and 27 years' experience assist you with your invention. Lowest prices. Hohmeier Mfg. Co., 1385 E. 17th St., Cleveland, Ohio.

MODELS, Dies, stamping, special manufacturing parts. Send for quotations. Badger Tool & Mfg. Co., 134 So. Clinton St., Chicago, Ill.

ACME Model Works, 200 North Jefferson St., Chicago, Ill.—Working models, mechanical, electrical and optical apparatus designed and built. Screw-machine work. Stamping.

SPECIAL Machine builders, tool and die makers, inventor's models production work of all kinds. Dept. L, Quality Hardware & Machine Co., Ravenswood and Thorndale Avenues, Chicago, Ill.

LET Our experience be your guide. Models that are models; tools and equipment for economic manfg. Patterns of all types; manufacturing in all branches. Satisfaction guaranteed. United Machinery Company, Cincinnati, U. S. A.

HOW To Make Clipper Ship Models, by E. W. Hobbs, one of the best books published on this subject. Price $3.00. Fore An' Aft, Huntington, N. Y.

MODELS, Tools, Dies and General manufacturing. Logan Machine Co., 652 W. Lake, Chicago, Ill.

MODEL and Experimental Work at lowest cost. Wagar Model & Machine Works, 115 So. Clinton Street, Chicago.

WE make working models for inventors and do experimental work and carry a complete stock of brass gears and model supplies. Send for catalogue. The Pierce Model Works, Tinley Park, Ill.

MODEL Steam engines and boilers for miniature boats. Compressed air plants for model airplanes. New catalog 15c. Model Machine Shop, 212 Price St., Rahway, N. J.

BUILD Your own ship model for $4.98. See ad on page 145.

THE Modelmaker, a magazine for all interested in making working models, boats, etc. Sample 10c. Modelmaker, 122 Liberty St., New York.

SHIP Model Fittings: Send Dime for booklet. A. J. Fisher, 1002 Etowah Ave., Royal Oak, Mich.

INVENTORS—We build models. Send us your rough idea. Our master mechanics will develop it for you into a practical working model. Thirty years successful experience doing this very thing. Best shop equipment. Expert advice. Confidential service guaranteed. Bank reference furnished. Send for free booklet "The Road To Success." Crescent Tool Co., Dept. A, Cincinnati, Ohio.

DEADEYES—⅛" 3-16" $3.50 hundred, belaying pins 18c dozen. C. Libby, Tuckahoe, N. Y.

SHIP Models—Worth while. Easy to make. Decorative Ships Picturesque Barbary Pirate Felucca and Beautiful Spanish Treasure Galleon (both 17th century). Instructions so simplified that any handy person can make these models with a few household tools almost without expense. No personal knowledge of ships or naval architecture required. New book only one of its kind. Pay postman $2.50 plus postage when book is delivered. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

ELECTRICAL

SAVE Money on Electrical Books—While they last we will supply the following books: Practical Electrics, Electrical Circuits and Diagrams, Electric Bells and Alarms, Induction Coils, Experimenting with Induction Coils, Experiments in Static Electricity, Wimshurst Machine, Small Accumulators, your choice of any four books for $1, postpaid. Regular price 35 cents per volume. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

NEW Electrical Dictionary. Complete up-to-date electrical dictionary to which has been added a special dictionary of radio words and terms together with illustrations of electrical symbols, radio diagrams and other wiring diagrams. 191 Pages — Vest pocket size. Price only 35c postpaid. Popular Mechanics Co., Room 807, 200 East

FOR MANUFACTURERS

MANUFACTURERS About to launch a new product: I will design and tool your article and perfect it for marketable serviceability, sales advtantage and quality production. M. Alva Zook, Industrial Engineer, Glen Ellyn, Ill. (Suburb of Chicago.)

MANUFACTURING

MANUFACTURING Models, dies, stampings, brass work, one or thousands. Circular free. Baum's Metal Specialties, Kansas City, Mo.

MODELS, Experimenting. Mechanical work, all branches. Complete contract manufacturing. Parma Engineering Works, Cleveland, (Brooklyn), Ohio.

INVENTIONS, Ideas developed, sheet metal or machine shop work, anything mechanical. Write for estimate. Pease, Lancaster, N. Y.

SPECIAL Machinery or parts, dies, tools, metal specialties, models, special gears, stock gears and model supplies. Send for Catalogue. The Pierce Model Works, Tinley Park, Ill.

ECONOMICAL Manufacturing from sheet, bar, wire or tubing. Models, dies, special machinery. Swanberg, 5124 N. Kildare Ave., Chicago.

WIRE goods made to order. Cooley Mfg. Co., 530 N. Western Ave., Chicago.

MACHINERY, TOOLS AND SUPPLIES

18x8' GRAY Engine lathe, $110.00; 18x 10' Steptoe engine lathe, $135.00; No. 1 Brown & Sharpe milling machine, $145.00; 10x5' Barnes engine lathe, complete, $95.00; 5 hp. electric motor, $45.00; No. 60 Heald cylinder grinder, $250.00; 36"x16' Fay & Scott engine lathe, $800.00; 24" Barker Shaper, $375.00; 10" Bench drill press, $19.00; 24" J. A. Fay wood pony planer, $175.00. Terms if desired. Write for catalog. Cincinnati Machinery & Supply Company, 27 West Second St., Cincinnati, Ohio.

SPECIAL Heavy duty portable electric drills that cannot be stalled by two men on each side. Quarter inch heavy duty, $22.00; ½", $45.00; ⅝", $58.00; ¾", $68.00. Five dollars down, balance easy terms. Money back if you want it. Over 20,000 sold last year. General Distributing Company, Security Building, Duluth, Minn.

BRAND New Millers Falls 4-½" capacity power hack saw machines, complete. Special price $35.00 each, f. o. b., New Haven. Botwinik Bros., Inc., 67 Water St., New Haven, Conn.

ICE Machines about half price at present. We have 1-6 ton Frick A-1 order, complete with motor, 1-10 ton York. Haborn, 208 N. Wabash, Chicago.

START business of your own, small investment required, doing nickel, copper and silver plating. This work in big demand. Information free. Electro Platers Supply Co., 547 Considine Ave., Cincinnati, Ohio.

CONCRETE Building Block Machines and Molds. Catalog free. Concrete Machine Co., 5 North Main St., St. Louis, Mo.

PERFECT Portable saw tables, mandrels, etc., for general woodworkers, manufacturers and repair shops. Factory to users catalogs. Peter M. Hoof Mfg. Co., Minneapolis, Minn.

SPEED Lathe $10.50 complete. 7 inch swing, 3 speed cone. Jefferson Mfg. Co., Fairfield, Iowa.

ENGINES, MOTORS AND DYNAMOS

EQUIP Your farm, summer resort, etc., with brand new Westinghouse 1 KW, 32 volt, light and battery charging generators at $48.00 each. Brand new ¼ hp. 32 volt, ball-bearing motors, $9.75 each. New Everlite 32 volt, 1,250 watt lighting plants, complete with engine at $169.75. Brand new quart type standard make, gasoline blow torches, $4.95 each; retails at $8.00. Six inch, 110 volt, brand new desk fans for home or office, $2.95. Satisfaction guaranteed. General Distributing Company, Duluth, Minn.

A FEW a.c. and d.c. Bodine electric motors (1-50 h.p., 110 volts) with thrust bearing, carefully inspected, as good as new, $3.50 each, cash with order, while they last. Display Appliance Company, 219 W. Chicago Ave., Chicago, Ill.

JUST Received another lot of brand new ¼ horse, 110 volt, 60 cycle, 1,750 speed, alternating motors with cord, plug, flat pulley and two-year factory guarantee, $7.00 each, $6.50 each, lots of six. Also other sizes of motors and generators. Alternating and direct current. Electrical Surplus Company, 1911 West Chicago Ave., Chicago.

ACTO Engines make excellent power plants in the shop, mine, mill or farm, but they need governing. We make the governors for $10.00 up. Circulars. Candee-Smith Governor Co., 215 W. Manchester, Los Angeles, Calif.; also St. Catherines, Ontario.

NEW 32 Volt farm plants, $140.00. New ½hp. repulsion Westinghouse motors, $27.50; ¼hp. $7.50; 110 volt direct current, $6.50; 32 volt motors, $5.50. Eight-day time clocks with 30 ampere switch, $6.75. Many other bargains in larger motors and generators. Queen City Electric Co., 1736 Grand Ave., Chicago, Ill.

NEW 3 HP. motor $75; one hp. motor $30; ½ hp. motor $18; 1,200 watt generator $45; Victrola and records $35. E. P. Cummings, Harrisonburg, Va.

FOR Sale: 1-6 hp. motors, 110 volt, 1,750 R.P.M., 60 cycle, alternating current. Slightly used. Good running condition. $4.50 each, while they last. Cash with order. The Maytag-Chicago Co., 337 W. Madison St., Chicago, Ill.

MAKE your own—half and one horsepower electric motors. A. C. Induction motor model shows winding connections plain sight. Quick easy way. Gaines Bros., Box 481, Gainesville, Texas.

STEAM Engines—One H. P. $18.00; ⅛, $12.00. James Chambless, Bessemer, Ala.

WRITE for bargain catalogs on electric motors, generators, electric drills, etc. Do not buy, consult us first. General Distributing Co., Security Bldg., Duluth, Minn.

BENDING MACHINES

THE Famous Hossfeld "Wrenchless" Universal Iron Bender is the last word in bending machines. Bends metal, cold or hot, into most any conceivable shape, including Eye Bolts and Automobile Spring Eyes. Bends up to 1" bars or 1½" pipe cold. Thousands in use by all classes of trade, from the smallest shops to the largest railway systems. Write for circular and prices. Hossfeld Mfg. Co., Winona, Minn.

BLACKSMITHS

BE a Master Mechanic Blacksmith and Expert Tool Maker and Dresser with colored tempering charts. Price $1.00. Valuable samples free. W. M. Toy, Sidney, Ohio.

WANTED—MISCELLANEOUS

MAIL Us your discarded jewelry, gold, crowns and bridges, watches, diamonds, silver, platinum. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable), Dept. 71, Chicago.

OLD Jewelry wanted, fobs, chains, rings, pins, etc. Highest prices paid for old gold, silver and platinum, etc. Satisfaction guaranteed or goods returned. F. Polcer, 2408 So. Cicero Ave., Cicero, Ill.

CASH Paid for old gold teeth, etc. Register all mail. The Thomas Laboratory, 366 E. 47th St., Suite 8, Chicago, Ill.

FOR SALE—MISCELLANEOUS

ALL Wool blue serge suits, $14.95, guaranteed. Write for sample. MacHenry Serge Co., 1719 West North Ave., Baltimore, Md.

ALL Metal pocket check protectors; closeout price, $5.00 huundred; sample 25c. Kant, 246 Third Ave., Pittsburgh, Pa.

LATEST and best House Wiring book—just published—This new book of over 250 pages and 600 illustrations represents 15 years of work in perfecting the material for the best House Wiring manual it is possible to produce. The work of two men high up in the fields of mechanical arts and electricity. Price $2.50 postpaid. Sent C. O. D. anywhere in the U. S. or possessions. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

ADDRESSOGRAPHS. Letter folders, multigraphs, envelope sealers, duplicators, less than half price. Guaranteed. Pruitt Co., 117 No. Market, Chicago.

BEAUTIFUL Model of "Old Ironsides"—Make it yourself from directions given in latest book on ship model making by Capt. McCann. You can follow either simplified instructions eliminating much work, or the plans for those wishing an exact scale model. Pay postman price $2.50 plus postage when he delivers book. Popular Mechanics Co., Room 807, 200 E. Ontario St., Chicago, Ill.

FARMS AND FARM LANDS

FLORIDA—For sale, 20 acres, N. W. Florida, DeFuniak Springs; poultry, grapes, fruits, truck; good roads, schools, churches; co-operative marketing; sunshine year round; big bargain; only $500; $200 down payment. You get clear title deed immediately; balance $18 a year; no interest. Great opportunity. Excursion every Tuesday. Round trip, $36.89. Chamber of Commerce booklet free. McCaskill Estates, 7 S. Dearborn St., Chicago.

LAND Opening—New 75 mile branch to be built this year in Montana, opens 1,500,000 acres good farm land. Profitable for wheat, cattle, sheep, hogs. Send for free New Line Book also free books on Minnesota, North Dakota, Montana, Idaho, Washington, Oregon. Low homeseekers excursion rates. E. C. Leedy Dept. 657, Great Northern Railway, St. Paul, Minn.

SMALL Fruit and poultry farms near Los Angeles. Ten years to pay. Send for free illustrated booklets. Fontana Farms Co., owners, Room 617, 631 S. Spring St., Los Angeles, Calif.

SELL your property quickly for cash, no matter where located. Don't pay big commission. Particulars free. Real Estate Salesmen Co., Desk B, Lincoln, Nebr.

PECAN-Orange-Fig Groves "On the Gulf" Monthly payments. Guaranteed care. Big, quick returns. Suburban Orchards, Dept. M. Biloxi, Miss.

ATTENTION! Get acquainted, cash for your property, farm, hotel or retail store, no matter where located; confidential service. Hayes Business Agency, Cincinnati, Ohio.

MONEY made in Mich. potatoes. $10 down now and easy terms buys land near markets, lakes, streams. Write today. Swigart & Co., P-1276, 1st Nat'l Bank Bldg., Chicago.

OZARKS — 10 acres near White River and proposed power dam, $100, $5 monthly. Alvin Zimmerman, 1802 N. 5th, Kansas City, Kans.

861 PRACTICAL Ways to Reduce Farm Labor and Expense and Increase Income. One farmer writes he would not part with this information for $100, if he could not duplicate it. Nothing experimental. These ideas have all been put to test and proven practical. Send today for a copy of our Handbook for Farmers and get ready to put these ideas into operation for your own benefit. Pay postman only 98 cents and the postage when he hands you the package. Popular Mechanics Press, Room 807, 200 E. Ontario St., Chicago, Ill.

ROOTS AND HERBS

OVER 1,000 Varieties medicinal herbs and roots. Tested and proved. Dime brings valuable recipe book and complete information. Botanics, 145 West 112th St., Chicago.

MUSKRATS

MAKE Money From Muskrat Fur—Raise Muskrats in dry land pens or hutches. Get the facts. 652, Conrad's Ranch, Denver, Colo.

RABBITS

LIVE Breeding stock. Deal with us and get what you want and pay for. "Hudson Seal" Musquash, well furred and healthy. "Rainy River Ontario" dark silky mink. Dark brown and black beaver. The rare strain of Mountain Silver Fox Rabbits. A real silver tipped black rabbit. Red and Cross foxs, racecoons, etc. We are the largest operators of fenced muskrat marshes in the world. Pen raised Hudson Seal Musquash. Live delivery and sex guaranteed. Ten Thousand Lakes Fur Farms Corporation, P. O. Lake Elmo, Minn. Located on Highway No. 12 (near St. Paul).

MAKE big profits with Chinchilla Rabbits. Real Moneymakers. Write for facts. 852 Conrad's Ranch, Denver, Colo.

SWINE

OHIO Improved Chester White boars, sows (pigs no kin, $10 each), vaccinated, pedigreed. Fred Ruebush, Sciota, Ill.

DOGS AND PETS

FOX Terriers, Collies, English, German Shepherds, Barnes Farm, Fairfield, Nebr.

ST. BERNARDS, Registered thorobred Puppies from Championbred parents. Prices reasonable, duty free, photos submitted. Helvetia Kennels, 181-P McKenna, Montreal, Que.

DR. LITTLE'S Dog Book—Most comprehensive book about dogs ever published. Fills a long-felt need for an authoritative manual on care, treatment and training of dogs for every dog lover. Pay postman $1 and postage when he delivers the book. Popular Mechanics Co., Room 807, 200 E. Ontario st., Chicago.

PERSONAL

HIGH Blood pressure inexpensively overcome, without drugs. Send address. Franklin Stokes, Mohawk, Fla.

INGROWING Nails; my copyrighted treatment never fails to correct. Booklet free. Write Eugene Eaton, D106, Bandon, Oreg.

TOBACCO Or Snuff habit cured or no pay! $1.50 if cured. Sent on trial. Frances Willard, Box 796, Los Angeles, Calif.

ADVICE, Information, any subject, 25c coin. Fred Klotz, Reading, Pa.

TOBACCO or Snuff Habit Cured or no pay. $1.50 if cured. Remedy sent on trial. Superba Co., N3, Baltimore, Md.

ENTERTAIN With magic and joke novelties! Easy. Latest craze. Book "500 Tricks" 10c. Lyle Douglas, Station A-5, Dallas, Tex.

DRY Clean your brain. Results amazing. Money back if not satisfied. Morris, 3608 Warren St., Philadelphia.

MISCELLANEOUS

MIRRORS Resilvered at home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating autoparts, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details free. Write Sprinkle, Plater, 288, Marion, Ind.

"TORN-Music-Cure," San Jose, Calif. Best "Dime" book-tape (transparent).

SPECIAL Offer—Your fountain pen cleaned, adjusted, point refitted, new sac put on for only 75c. This includes postage when money is sent with order. The Pleasant Pen Shop, 1623 Pleasant St., Cincinnati, Ohio.

TATTOOING—Learn how with my outfits. Descriptive circulars sent anywhere. Sergt. Bonzey, 367 South Main, Providence, R. I.

ARTISTS And art students are printing 250 signs or pictures an hour without machinery. Sample and particulars 10c. Straco, 1013 Mulberry, Springfield, Ohio.

YOU Can emboss your stationary as needed. Perfect work guaranteed. Simple—inexpensive. Miller Sales Company, Dept. E, Lexington, Ky.

DRAWING, Painting—Trade marks, homemade rugs. Rockland Studio, Route 8, Lockport, N. Y.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 24.

YOUR Cartoon on business cards. Write for samples and particulars. Seamann Studio, 2104 Liberty Ave., Terre Haute, Ind.

ARE You old at forty? See our advertisement on page 64 of this issue. The Electro Thermal Company, 2108 Morris Ave., Steubenville, Ohio.

TATTOOING—Learn how with my outfits. Descriptive circulars sent anywhere. Sergt. Bonzey, 367 South Main, Providence, R. I.

SPEEDY Bows, complete archery equipment, Catalog free. Perkins Archery Shoppe, Grand Rapids, Mich.

AMAZE And Mystify! Fool your friends—earn money giving shows. Easily learned. Big book "Fun-Magic-Mystery" tells how. Postpaid 10c. Lyle Douglas, Station A-5, Dallas, Tex.

TOYS And Furniture easy to build from my blueprints. Send two-cent stamp for list. Address, Wooderaft, Box 436, Troy, N. Y.

A PENCIL portrait or cartoon of your photo for $1.10; both for $1.70. L. Tashjian, Madeira, Calif.

GILDING, Polychroming, composition, tar moulds, ornament casting instructions. One dollar. Brad Hardacker, Jamul, Calif.

TATTOOING Outfits, supplies. Illustrated list free. "Waters," 965 Puttnam, Detroit.

WEEDS—Cut them with cutter bar on Shaw Garden Tractor. Also plows, cultivates and runs belt machinery. Low prices. Immediate delivery. Shaw Manufacturing Company, Department C, Galesburg, Kans.

CUTS anybody can make. Simple, cheap process. $1. Specimens, particulars. 2c stamp. M. Day, Windfall, Ind.

AMATEUR Cartoonists: Make money in spare time with new cartoon selling plan. Write Smith's Service, PM1194, Wenatchee, Wash.

MEXICAN Made Holsters, lariats, horsehair articles; rattlesnake belts. Send four cents for catalog. Tex-Mex Leather Co., 309 Esperson Bldg., Houston, Texas.

HOMEOPATHIC And Biochemic preparations sent postpaid to all parts of the world. Manual and booklet free. Halsey Bros. Co., 5547 Ravenswood Ave., Chicago, Ill. Established 1855.

TELL An army of 3,000,000 live readers all about your offer! If you have anything to sell, buy or exchange, or if you have any reasonable proposition, tell our readers all about it—they'll respond quickly. Our booklet "How to Create More Business" contains some very interesting, helpful facts. Write today for your copy—it's free. M. L. Rund, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

DRAFTING

BOOKS SENT FREE!

Only fifteen minutes a day with these WONDER BOOKS will prepare you for a good Drafting job in less than a year! Mechanical and Architectural Drafting from simple straight lines to important, complex plans, *a step at a time!* Built especially for beginners, for men with only grammar schooling. Drafting room practice *plus engineering* made easy and clear!

For Beginners

Written so you can understand every word, by 18 famous Engineers and Architects. Deluxe, flexible binding. 1750 pages, 1050 blue prints, charts and diagrams. Prepares you for a good Drafting job in mechanical or architectural lines. Sent for 15 days' free use, if you mail coupon immediately.

Big Field—Big Demand—Big Pay!

Competent Draftsmen are urgently needed right now in all building and manufacturing lines at $50 to $100 a week. That's just the beginning—*for draftsmen have the best chances for advancement!* Pleasant, fascinating work, easy to learn and do. Learn quick with these books—send coupon for a set FREE, and see for yourself.

A year's Consulting Membership in the American Technical Society now given free to all readers of this famous Cyclopedia of Drafting. Many say that's worth more than cost of books.

American Technical Society
Dept. DC-19, 58th & Drexel Ave., Chicago

Modern American Homes FREE!

American Technical Society
Dept. DC-19, 58th & Drexel Ave., Chicago

Send for 15 days' free use 4-volume set of *DRAFTING*. In return for mailing this coupon promptly send absolutely FREE "*Modern American Homes*," 112 plates, exteriors, interiors and plans. I will pay the few cents delivery charges. If I wish I may return books in 15 days and owe you nothing. But if I prefer to keep them I will send $1.80 after 15 days, then $2.00 a month until $14.80 (special reduced price) is paid.

Name.....

Address.....

Employed by.....

Address.....

Electricity!

Learn in Los Angeles

Be an electrical specialist. Gain quick success in this most fascinating and profitable field. Learn at National in the center of tremendous electrical projects costing more than $100,000,000.00—unlimited opportunities now.

Practical, intensive training by National's job-experience method in 6 to 9 months. All technical essentials included. School endorsed by leaders in electrical industry. You learn all branches of electricity; radio. Million dollar institution; all modern equipment and training facilities. Life scholarship. No age limit. Free employment service. Over 17,000 successful graduates. 23rd year. Big illustrated 84-page catalog sent FREE. Write today.

NATIONAL ELECTRICAL SCHOOL

Dept. 522 — 4006 Figueroa St., Los Angeles, Calif.

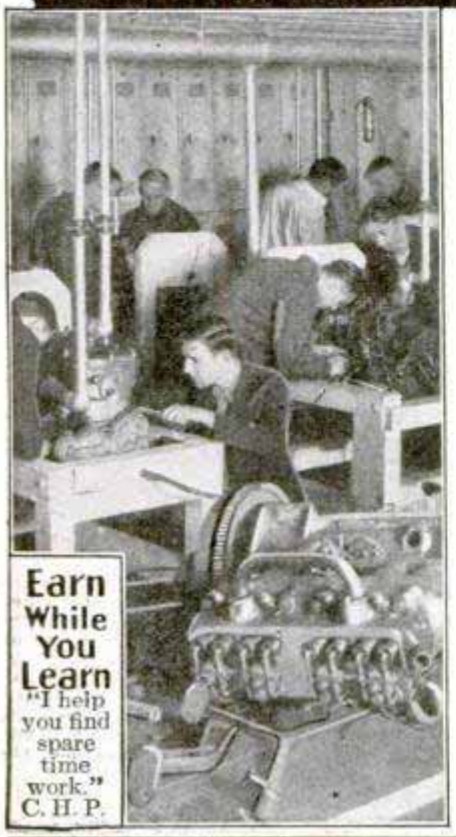
Free Book — Send me the big, FREE National Electrical Book that explains everything.

*Name*_____

*Address*_____

*City*_____ *State*_____

Earn $75 to $100 a Week as AUTO MECHANIC—



Learn Easily in 8 Weeks on Real Machinery—

No Dry Books No Lectures

Eight short weeks of pleasant, fascinating, practical auto work in my big shops—and then a real job paying $75.00 to $100.00 a week! You can step right out of low pay, long hours, and no future into the job of a high-salaried auto mechanic. Everywhere jobs are waiting for men trained as I train them. Change the whole course of your life in 8 weeks!

Employment Dept. Helps My Graduates

Come to my shops. I will make you a mechanic able to handle the hardest auto jobs quickly and easily. I'll teach you to know autos inside out. You don't need education. You don't need previous experience. All you need is ambition. You learn by doing—by working on actual cars with real tools. This is not a correspondence course.

I'll Pay Your R. R. Fare
Clyde H. Pratt
President

Short Cut to Big Pay

Learn how easy it is to get a steady, big-pay job in the great auto field. Learn what other fellows like you have done with CLEVELAND Auto Training.

Mail Coupon for Book

CLEVELAND AUTO SCHOOLS
1815 E. 24th St., Cleveland, Ohio

Clyde H. Pratt, Pres.,
CLEVELAND AUTO SCHOOLS,
1815 E. 24th St., Dept. M-2, Cleveland, O.
Please send me FREE BOOK on Auto Mechanics, and details of spare-time work and Employment Help.

Name.....

Address.....

City..... State.....

Be a drummer!

Trap Drumming made easy in a short time. Our free instruction course furnished with genuine Ludwig Trap-Drum Outfit. Develop your natural sense of rhythm. Go to your nearest dealer or write for full details.

LUDWIG & LUDWIG, 1611 North Lincoln Street, Chicago

Big Muscles IN 30 DAYS

FREE BOOK Tells How

One month from today you'll be a **Giant of Strength.** I'll cover your body with powerful, solid **Muscle.** Just watch them **Grow.** It's **Easy.** Send for my big, new **Book.** Full of astounding secrets of strength and amazing demonstrations of muscle-building. Just mail name and address to

TITUS, Dept. M-129, 105 East 13th Street, New York City

Learn Watchwork, Jewelrywork and Engraving

A fine trade commanding a good salary, and your services always in demand. Address **Horological,** Dept. P, Bradley Institute, PEORIA, ILLINOIS, for our latest catalog.

ADDING MACHINE GIVEN

Just the thing for boys and girls in your school work. You always know the correct answer. Adds, subtracts, multiplies and divides. Not a novelty or toy, but a real necessary article. Strong, attractive, durable and absolutely accurate. Send name and we will send you 6 pictures to distribute on 25c offer. Send $1.50 you collect and we'll send **LIGHTNING ADDING MACHINE** all charges paid. Write today.

C. M. THOMAS — Dept. 91 AM
337 W. Madison St., CHICAGO

Achieve SUCCESS! in Radio

Finest instruction—*at Home!*

Good pay from the start, rapid advancement, and phenomenal success—a life profession of fascinating brain-work—that is what Radio holds for the man who knows his subject thoroughly. Since 1909 RIA has trained thousands to become successful in Radio. Are you going to plod along at a thirty-five-dollar-a-week job when REAL MONEY is waiting for you in Radio?

R. L. DUNCAN
Director, R. I. A.

Prominent radio men have enthusiastically greeted RIA'S new course as the finest and most complete radio instruction offered today. It starts with the very fundamentals and takes you through every phase of radio—right through television, photoradiograms and airplane radio equipment.

Radio Institute of America's students must have the best. So we provide, without charge, all the first-quality material you need (except tubes) to make twelve different radio circuits—as well as the Peerless Signagraph, key and buzzer set for code instruction.

RIA is backed by RCA, G-E and Westinghouse. Our employment department is at the service of graduates. STUDY AT HOME—when you please and as long as you please! This new booklet describing the course and radio's big opportunities is just off the press. Mail coupon now for your copy.

RADIO INSTITUTE OF AMERICA
Dept. P-8, 326 Broadway, New York City
Dear Mr. Duncan: Please send me your new catalog.
Name.....
Address.....

Learn in the SKY ABOVE MARSHALL

You don't learn to swim on dry land—and you don't learn to fly on the ground! Here at Marshall we take you right up into the sky in safe, dual control planes—and teach you to **fly by flying.**

The College of the Air

The Marshall Flying School is the original College of the Air. Nearly a half-million dollars' worth of equipment is at your service here. We are affiliated with the famous Nicholas-Beazley Airplane Co., Inc.—whose chief engineer, Walter H. Barling, is a world authority on aviation.

Nationally known instructors—a large, illuminated four-way flying field — well equipped school buildings—and the Marshall Fleet of ships: these are some of the many advantages Marshall offers.

Earn Big Money

Marshall graduates are making big names for themselves—earning substantial incomes in every branch of the business—as pilots, mechanics, dealers, salesmen, technicians.

Get This FREE Booklet!

Write today for our interesting FREE booklet showing Marshall scenes, telling about the school in detail.

MARSHALL FLYING SCHOOL, Inc.

630 N. English Street **MARSHALL, MO.**

These famous electrical books make promotion sure!

59,000 men are using the Croft books to step ahead in Electrical work. WHY NOT YOU! This 8-volume library covers electrical practice complete, from the simplest principles to the operation of a great central station. The books pave the way to the big-pay job by teaching you electricity as experts know it.

The Croft Library of Practical Electricity

A combined reference library and home study course—8 volumes, 3000 pages, 2100 illustrations

The man who gets anywhere in any line of endeavor is the man who KNOWS. And generally the more he *knows* the more he *earns*.

For the man who wants to know, there is nothing better than these eight volumes packed to the covers with sound, helpful information on every phase of electricity from first principles to central station work.

SEE IT FREE—
No obligation to Purchase

By just filling out and returning the coupon below you will have, at no cost to you whatsoever, a practical, useful set of books for 10 days' Free Examination. We take all the risk—pay all charges. You assume no obligation—you pay nothing unless you decide to keep the books. Send the coupon NOW and see the books for yourself.

$1.50 in 10 days and then only $2.00 a month

FREE EXAMINATION COUPON

McGRAW-HILL BOOK CO., Inc., 370 Seventh Ave., New York

Send me for 10 days' free examination the library of Practical Electricity. If satisfactory, I will send you $1.50 in 10 days and $2.00 monthly until the special price of $19.50 is paid. If not wanted, I will return the books at your expense.

Signed.....

Address.....

City and State.....

Position.....

Company.....*P. M. 8-28*

"At 61"

"I thought I was through. I was half-living—getting up nights—constantly tormented with aches and pains. At 62 my condition became almost intolerable. Then at 63, I shook off 20 years almost overnight."

"How I Licked Wretched Old Age at 63"

IN 65% of all men, the vital prostate gland slows up soon after 40. Pain may not appear instantly. But gradually symptoms often develop that lead to sciatica, backache, bladder weakness, constipation, etc. But now a new, safe way has been discovered by a simple home treatment to restore the prostate to normal health. The reports on many cases are amazing. Many physicians use and recommend it. No drugs, medicine, surgery, or electric rays.

FREE! A 24-page illustrated book fully describes it. The edition is limited. Send for a free copy. Every man past forty should know the meaning of these frank facts. Simply write The Electro Thermal Co., 2108 Morris Ave., Steubenville, Ohio. Western Address: Dept. 21-H, 303 Van Nuys Bldg., Los Angeles, Cal.

Learn How to BOX

JIMMY DeFOREST BOXING COURSE

Teaches by mail the Same System he taught Champion JACK DEMPSEY

In 20 weeks, under the System of Jimmy DeForest, WORLD'S GREATEST TRAINER AND MAKER OF CHAMPIONS, you will master the priceless knowledge that made Jack Dempsey his millions, and fortunes for a host of other Jimmy DeForest-trained ring stars. Boys who were once rank amateurs are today earning big money; weaklings have been made strong, courageous; men have learned the art of self-defense. Send today for the now famous book, "THE GOLDEN AGE OF BOXING," greatest book of its kind ever written; full of valuable information, photos of great fighters and pupils who became successes over night. Enclose 10c to cover cost of mailing, etc. WRITE NOW.

JIMMY DeFOREST BOXING COURSE
347 Madison Avenue, Box 133, New York City

MONEY—fame—adventure—they all await you in Aviation! You can make from $75 to $300 a week after thorough training. You may be internationally famous in a year! We give you complete flying and ground instruction on new production ships, and on Whirlwind, Camines, and other latest engines. Learn to fly by flying with expert transport pilots. Parks is not a correspondence school. Send for "Skyward Ho!", the free book that shows you all about it.

Parks Air College, Inc., 212-E Missouri Theatre Bldg., St. Louis, Mo.

$4,500 in ONE Sale

That's what L. C. Clarke made. Formerly a brakeman, earning an average of $638.40 a year. Got started in real estate. Used my successful system. Now has large real estate business of his own. Do as he did. Be a **Real Estate Specialist.** Use my money-making system. Start in spare time, without capital or experience. Send for free book now.

Address President, American Business Builders, Inc., Dept. 44-8, 18 East 18 Street, New York, N.Y.

FLY

The Finest Opportunity to Get Into the Airplane Game

Through the combined efforts of one of Chicago's leading AIRCRAFT factories and airplane sales agency we can offer you a course in flying and ground work that is complete in every detail. You learn to build real airplanes. You fly in modern and government licensed ships piloted by licensed pilots. Employment assistance given to students who must earn while they learn. A reasonable amount will start you.

Commercial Aircraft Sales., 644-Diversey Pkwy., Chicago

BE AN OIL EXPERT!

Trained men needed! Geologists, Drillers, Refiners (Chemists and Still Men), Oil Salesmen, earn 2 to 10 times more than in other fields. Write today! FREE Booklet! Petroleum Engineering University, Dept. 228, Fort Wayne, Ind.

PAINT SHOW CARDS

and SIGNS. LEARN AT HOME IN SPARE TIME. EARN $75 WEEKLY. FORTY LESSON COURSE. PRICE $45.00. $5 DOWN. $5 MONTHLY. CIRCULAR FREE.

Universal School of Lettering WATERBURY, CONN.

AGENTS—SALESMEN

ALL-IN-ONE patented Cigarette and Match Case. Holds a package of cigarettes and box of safety matches. Beautiful, grain finish Black or Brown Du Pont Fabricord. Keen and convenient.

A whirlwind seller for agents. Costs $3.60 dozen, $36.00 gross. Write today for complete details.

ALL-IN-ONE SALES CO.
Dept. A-7 2810 Portland Ave.
MINNEAPOLIS, MINN.

Sample, 50c

---

if-

you pledge

yourself to secrecy we will teach you the secrets of

Real Professional

Magic

Dr. Harlan Tarbell, internationally known magician and teacher of some of the world's greatest magicians.

Be a Magician!

Earn $250 to $1000 a Month

For the first time in the history of Magic the age-old, sacredly guarded secrets of Mystic Art are being revealed. Now at last you can learn to be a Real Professional Magician. Yes, and you can learn this wonderful art *easily and quickly* AT HOME. You are taught the mysterious *Principles* by which the Professional Magician works. But before you can study, you must sign the Magician's Solemn Pledge of Secrecy. This means you are getting the *guarded secrets* of the Magic Profession.

WRITE! Mail coupon now for big free Magic Book telling all about the great Tarbell Course in Magic. ***Get Our Low Prices and Easy Payment Plan.***

Tarbell System, Inc., Studio C-135
1920 Sunnyside Avenue, Chicago, Ill.

Gentlemen: Without any obligation send me your free literature and information all about your wonderful "Tarbell Course in Magic." Also tell me about your Low Price Offer and Easy Payment Plan.

Name .....

Address .....

..... *Age* .....

LUMINOUS PAINT

Make Your Watches, Clocks, Etc., Visible by Night

The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, **emits rays of white light, rendering it perfectly visible** in the dark. **THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES.** Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Small bottle, **price 25c.** Larger sizes, **50c** and **$1** postpaid. **JOHNSON SMITH & CO. Dept. 826 RACINE, WIS.**

CIGARETTE MAKER

Roll your own and save money. Better and quicker; saves more than half. Use your favorite brand of tobacco. Neat, useful, handy. Pocket size, weighs ¾ oz. Made entirely of metal, nickel plated. **25c, 3 for 65c postpaid anywhere.**

GOOD LUCK RING

Very striking, quaint and uncommon. Silver finish; skull and crossbones design, two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. **Only 25c ppd.**

Exploding Cigarettes

JUST LIKE ORDINARY CIGARETTES, BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud BANG! A great mirth provoker yet entirely harmless. **Price 25c box.**

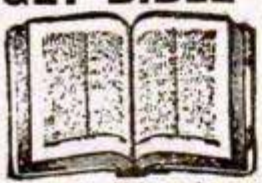
NOVELTY BADGES

Kissing Permit 10c *Garter Inspector 10c*

Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. **10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.**

MIDGET BIBLE

GREAT CURIOSITY Smallest Bible in the World. Size of a postage stamp. **200 Pages.** Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE **15c** each, **3** for **40c**, **12** for **$1.35**, **100** for **$7.50.** Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass** for use with Midget Bible, **15c.**



STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.**

Comical Motto Rings

Lots of harmless fun and amusement wearing these rings. Made in platinoid finish (to resemble platinum), with wording on enameloid, as illustrated. **Price, only 25c Postpaid. Johnson Smith & Co.**

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. **10c** Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

These clever locks cannot be opened unless you know the combination. No key necessary. For your locker, bicycle, tool chest, mail box, thousands of uses. Shackle and tumblers nickel plated. Weighs a trifle over one ounce, finally yet strong. Secret and full instructions with each lock. **Price 25c or 3 for 65c postpaid.**

Keyless Lock

25c Postpaid

Wonderful X-Ray Tube

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A mystery that no one has been able to satisfactorily explain. **Price 10c, 3 for 25c, 1 dozen 75c. Johnson Smith & Co.**

Every Boy His Own Toy Maker

A great book for boys. It gives plain, practical instructions for making all manner of toys, machines and other articles, amusing and useful. Tells how to make a Steam Engine, a Photographic Camera, a Windmill, Microscope, Electrical Machine, Galvanic Battery, Electric Telegraph, Electrotyping Apparatus, Telephone, Kaleidoscope, Magic Lantern, Aeolian Harp; how to make Boats of all kinds, Kites, Balloons, Paper Toys, Masks, Card Racks, Wagons, Carts, Toy Houses, Bows and Arrows, Pop Guns, Slings, Fishing Tackle, Rabbit and Bird Traps, etc. 200 illustrations. **PRICE 75c Postpaid. JOHNSON SMITH & CO.**

Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually hatched itself into a snake several feet long, which curls and twists about in a most life-like manner. **Price per box, 10c postpaid, 3 for 25c.**

JOHNSON SMITH & CO.

Dept. 826 RACINE, WIS.

A De Luxe Edition of our new 1928 CATALOG mailed on receipt of 25c. Handsome binding. Bigger and better than ever. Only book of its kind in existence. Nearly 600 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unprocurable elsewhere. Remit by Stamps, Coin, Money Order, Check, etc. Unused U. S., Canadian and Foreign Stamps also accepted.

BLANK CARTRIDGE PISTOL

Protection against Burglars, Tramps, & Dogs

Special Offer
1 Blank Cartridge Pistol
100 Blank Cartridges
1 550-page Novelty Catalog
ONLY $1.50
The Lot
Shipped by Express Only
Cash With Order Only

Well made and effective, modelled on latest type of Revolver; appearance alone is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard .22 Cal. Blank Cartridge—obtainable everywhere. **Special cash with order offer:** 1 Superior quality Blank Cartridge Pistol, **100** Blank Cartridges, and our new **550** page De Luxe Catalog of latest novelties; all for **ONLY $1.50.** Shipped by Express only. Cannot go by parcel post. Extra Blank Cartridges **50c** per **100.** Special Holster (Cowboy Type) for pistol **50c.** No C. O. D. shipments.

THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it.

Never Fails. A 16 page course on ventriloquism, the Ventrilo, ALL FOR 10 CENTS

MAGICIAN'S BOX OF TRICKS

Apparatus and Directions for a Number of Mysterious Tricks, Enough for an Entire Evening's Entertainment . . . $1.00

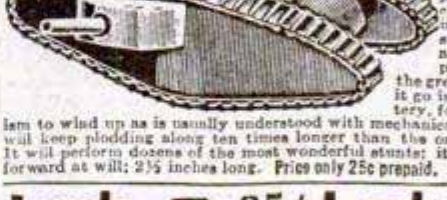
Anyone Can Do Them

It is great fun mystifying your friends. Get this Conjurer's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for ten first-class tricks, including The MAGIC BALL AND VASE TRICK (a wooden ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); The HINDOO TRICK CARDS (can be made to change completely no less than five times); DISAPPEARING COIN BOX (a coin, placed in the wooden box, vanishes entirely or changes into a coin of another denomination); The GLASS GOBLET TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); the RIBBON FACTORY FROM THE MOUTH TRICK (a seemingly endless supply of colored paper ribbons comes out of your mouth); the DISAPPEARING HANDKERCHIEF (a handkerchief held in the hand mysteriously vanishes); the WIZARD'S RING COIN TRICK; the ENCHANTED BOTTLE (no one but yourself is able to make it lay down); the GREAT HAT AND DICE TRICK (a large dice is placed on top of a hat, disappears, and is found underneath yet no one has touched the hat), and last, but not least, the GREAT PHANTOM CARD TRICK, or two from five leaves nothing. Full instructions are sent for performing each trick. In addition to the above, a number of other feats and illusions are fully explained for which you can easily make or procure the necessary apparatus. **Price complete $1.00 postpaid.**

U. S. BABY TANK

It goes with real Yankee Pep—by its own power

25 Cents



Most remarkable toy ever invented. By drawing the Tank backward, either with the hand or over the floor or table and then placing it down, it will crawl along, overcoming all obstacles, in the same lifelike manner as the larger Tank that proved so deadly in the great war. What makes it go is somewhat of a mystery, for there is no mechanism to wind up as is usually understood with mechanical toys, yet this tank will keep plodding along ten times longer than the ordinary run for toys. It will perform dozens of the most wonderful stunts; it will go backward or forward at will; 2½ inches long. **Price only 25c prepaid. JOHNSON SMITH & CO.**

Look 35¢ Look

Wonderful Instrument.

Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, curious and interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngascope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail. **Only 35c or 3 for $1.00**

JOHNSON SMITH & CO., DEPT. 826, RACINE, WIS.

New Patent Law Revisions

1927 revisions of the Patent laws; amendments to the rules of practise of the Patent Office; new forms; and material bringing the law of employer-employee rights up to date, are included in this edition, *just published*, of

ROBB'S PATENT ESSENTIALS

For the Executive, Engineer, Lawyer, and Inventor

(NEW AND REVISED EDITION)
By John F. Robb, LL.B., LL.M., M.P.L.

The standard in its field—for laymen and attorneys alike. It gives in non-technical language a practical explanation of the nature of patents, the mechanics of their procurement, the scientific drafting of patent claims, conduct of cases, and special proceedings, including forms, together with complete illustrative cases. *An indispensable guide for every one interested in patents.*

485 pages, with 9 full-page illustrations and charts.
Price $5.00, net; $5.18, post-paid.
At All Booksellers or From
Funk & Wagnalls Company, 354-360 Fourth Ave., New York City

Electrical Engineering

Foremost, best equipped electrical school in America, 24 years old, offers a complete practical course in Commercial Electrical Engineering in one year. Lacking credits can be made up. Shorter courses available in: Residence Courses in Armature Winding, Radio, Broadcasting, Automotive Elect., Elect. Refrigeration. Recognized expert faculty. Splendid laboratory facilities.

B. S. DEGREE

Learn While You Earn We will aid you earn your way partly thru college. Board and room at cost. Write today for illus. catalog. Mention age, education and course interested in.

FREE CATALOG **SCHOOL OF ENGINEERING** **163 E. Wells St.** **P. M. 8-28 Milwaukee, Wis.**

TELEGRAPH-RADIO

Operators earn $150 to $350 month and up. Learn in Chicago or at home. Chance to work while training. We furnish operators to U. S. Govt., Railroads, Com'l Cos., Broadcasting Stations and Ships.

CHICAGO TELEGRAPH INSTITUTE, Dept. 1-8-8, 1338 So. Michigan Ave., CHICAGO, ILL.

YOUR RIGHT VIBRATION

"Mass-Intellectual Pressure and the Alpha-Matho Vibratory Scale"—thousands are obtaining results in business, sports, individual endeavors by new science of vibration. **19th edition, price $1.**

MACK STAUFFER, 918 W. Terrell Ave., Fort Worth, Texas, U. S. A.

The Expert PAINT MIXER

A new book for House and Structural Painters Thorough instruction in mixing all paints for interior and exterior use, with directions for applying. Also much practical knowledge of color, bases, pigments and liquids. Sent for $1.25 with return privilege. Write for catalog of PAY-RAISING BOOKS.

DAVID McKAY CO.
Dept. 28, 604 So. Wash. Sq., Philadelphia, Pa.

New Food Idea Pays Big Profits!

Men! Women! Investigate the wonderful NEW Brown Bobby GREASELESS Doughnut. Sells like wildfire! You can easily make $50 week sparetime; $5000 to $8000 year full time. Investment *small!* No experience needed. Write today for big special offer.

FOOD DISPLAY MACHINE CORP.,
Dept. C-135, 500-510 No. Dearborn St., Chicago

$10.00 PER MONTH BUYS
Fibre-Life Limbs

NEXT TO NATURE. BRACES MADE TO ORDER. AGENTS WANTED. FREE FIBRE SAMPLE **WORMAN CO.** **252-P HENNEPIN AVE. MINNEAPOLIS, MINN.**

Big Money Selling Advertising Work Suits!

Wonderful new idea brings you easy, extra profits. Take orders for Leeding Advertising Work Suits. Have Firm name woven on back. Advertise Firm's or merchant's business. New! Fast selling! Biggest values! Workmen and business houses everywhere are prospects.

Make $75 a Week

Big money for you, spare or full time. Quantity sales from business houses, manufacturers. BIG wholesale profits. Names individually woven into cloth—choice of colors. Garments, extra heavy, durable cloth. Cost no more than ordinary overalls. Big, roomy, comfortable. Guaranteed satisfaction. **OUTFIT FREE.** Complete line numerous samples, prices and styles. Also kiddies' play suits, name woven on front. Full instructions. Send for outfit now. Snap up easy profits. Write—AT ONCE!

THE JOHN LEEDING CO.
70 E. 18th St. Dept. NH-8 Chicago, Ill.

"What would I do if I lost my job?"

SUPPOSE your employer notified you tomorrow that he didn't need you any longer? Have you any idea where you could get another position?

Don't have this spectre of unemployment hanging over your head forever. Train yourself to do some one thing so well that your services will be in demand. Employers don't discharge such men. They *promote* them!

Decide today that you are going to get the specialized training you must have if you are ever going to get—*and keep*—a real job at a real salary. It is easy if you really try.

Right at home, in the odds and ends of spare time that now go to waste, you can prepare for the position you want in the work you like best. For the International Correspondence Schools will train you just as they are training thousands of other men—no matter where you live—no matter what your circumstances or your needs.

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 5549-F, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject *before* which I have marked X in the list below:

BUSINESS TRAINING COURSES

☐ Business Management	☐ Business Correspondence
☐ Industrial Management	☐ Show Card Lettering
☐ Personnel Management	☐ Stenography and Typing
☐ Traffic Management	☐ English
☐ Accounting and C.P.A. Coaching	☐ Civil Service
	☐ Railway Mail Clerk
☐ Cost Accounting	☐ Mail Carrier
☐ Bookkeeping	☐ Common School Subjects
☐ Secretarial Work	☐ High School Subjects
☐ Spanish ☐ French	☐ Cartooning
☐ Salesmanship	☐ Illustrating
☐ Advertising	☐ Lumber Dealer

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Work
☐ Architectural Draftsman	☐ Airplane Engines
☐ Building Foreman	☐ Plumber and Steam Fitter
☐ Concrete Builder	☐ Plumbing Inspector
☐ Contractor and Builder	☐ Foreman Plumber
☐ Structural Draftsman	☐ Heating and Ventilation
☐ Structural Engineer	☐ Sheet-Metal Worker
☐ Electrical Engineer	☐ Steam Engineer
☐ Electrical Contractor	☐ Marine Engineer
☐ Electric Wiring	☐ Refrigeration Engineer
☐ Electric Lighting	☐ R. R. Positions
☐ Electric Car Running	☐ Highway Engineer
☐ Telegraph Engineer	☐ Chemistry
☐ Telephone Work	☐ Pharmacy
☐ Mechanical Engineer	☐ Mining Engineer
☐ Mechanical Draftsman	☐ Navigation ☐ Assayer
☐ Machine Shop Practice	☐ Iron and Steel Worker
☐ Toolmaker	☐ Textile Overseer or Supt.
☐ Patternmaker	☐ Cotton Manufacturing
☐ Civil Engineer	☐ Woolen Manufacturing
☐ Surveying and Mapping	☐ Agriculture ☐ Fruit Growing
☐ Bridge Engineer	☐ Poultry Farming
☐ Gas Engine Operating	☐ Mathematics ☐ Radio

Name.....

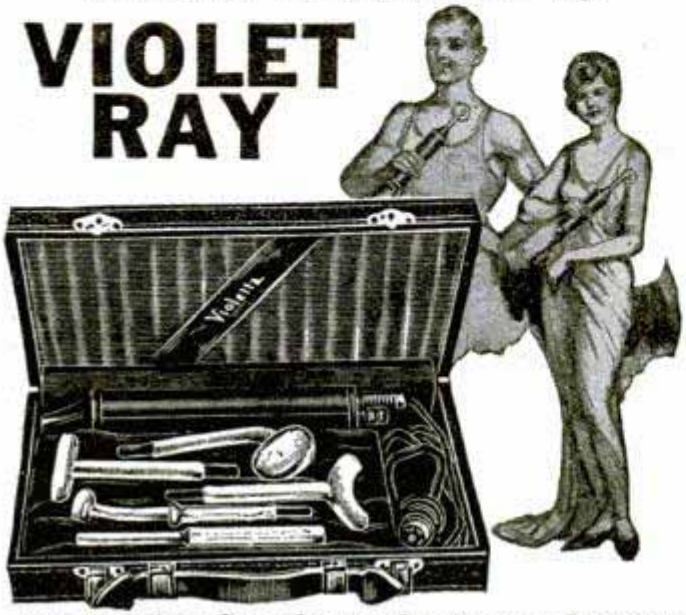
Address.....

City..... State.....

PAIN and DISEASE

Quickly Conquered by

VIOLET RAY



Let us tell you how thousands of men and women suffering from rheumatism, neuritis, paralysis, nervousness, skin diseases, headaches, constipation, sprains, prostate trouble, goitre and many other ailments, even hay fever and asthma, have found quick relief—new health and vitality with this marvelous, scientific invention. Pains vanish almost instantly.

Violetta

Ten Days FREE Trial

For Health—Beauty—Vigor

Endorsed and used by hospitals, sanitariums and physicians. Every home can now have one. Saves hours, days, months of suffering. No medicine. Painless, pleasant treatment. Only the violet ray can penetrate to every nerve affected. Simple, safe, painless—anyone can use VIOLETTA. Why suffer pain and poor health when you can try VIOLETTA 10 days FREE.

This Book FREE

Tells all about violet rays—how this marvelous discovery by Nikola Tesla, the electrical wizard, now brings this mysterious curative power to all. Contains many astounding testimonials from our thousands of satisfied users. Send for the facts and our liberal trial offer today. Mail the coupon now.

VI-REX CO., Dept. 831
2304 Warren Avenue, Chicago

VI-REX CO., 2304 Warren Ave., Dept. 831 Chicago

Please send me your free book on Violet Rays and details of your 10 days' free trial offer.

Name.....

Address.....

City.....State.....

Ailment.....

Learn to Dance

This New Easy Way

You can learn all the modern dances—Charleston, Black Bottom, Valencia, Canter, French Tango, St. Louis Hop, Latest Waltzes, Fox Trots, etc., at home easily and quickly. New chart method makes dancing as simple as A-B-C. No music or partner required. Learn anywhere, anytime. Win new popularity. Be in demand at parties. Same course of lessons would cost $20 if taken privately.

Send No Money

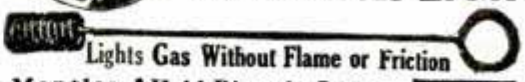
Just send your name and address. We'll ship the complete course—323 pages, 49 illustrations—without one cent in advance. When package arrives, hand postman only $1.98, plus delivery charges, and this wonderful course is yours. Try for 5 days. Money back if not delighted. Send your name NOW.

FRANKLIN PUB. CO., 800 N. Clark St., Dept. 9416, CHICAGO

HEAVIER PROFITS—LIGHTER SALES
MASTERLITE CIGAR LIGHTER

Guaranteed for life. Sells on a flash demonstration to smokers and dealers at big profits. Each sale brings everlasting repeat business. $3.00 brings sample dozen in handsome display box with sure-fire selling plans. Sample 50c.

RADIO GAS LIGHTER



Lights Gas Without Flame or Friction

Lights Mantles, Gas Stoves, Jets and Heaters. | **Hold Directly Over Gas Flow. Lights Instantly.**

A big 25c Seller, paying 300% profit. A gross easily sold in a day, nets you $26.00 profit. Rush $10.00 for gross, or $1.00 for sample dozen with sure-fire self-selling plans.

MASTERLITE MFG. CO., Dept. H-23
110 E. 23rd St. NEW YORK

Learn Watchwork, Jewelrywork and Engraving

A fine trade commanding a good salary, and your services always in demand. Address **Horological,** Dept. P, Bradley Institute, PEORIA, ILLINOIS, for our latest catalog.

QUIT TOBACCO

No man or woman can escape the harmful effects of tobacco. Don't try to banish unaided the hold tobacco has upon you. Join the thousands of inveterate tobacco users that have found it easy to quit with the aid of the Keeley Treatment.

KEELEY TREATMENT STOPS Tobacco Habit

Quickly banishes all craving for tobacco. Write today for Free Book telling how to quickly Free yourself from the tobacco habit and our Money Back Guarantee.

THE KEELEY INSTITUTE
Dept. A 912 Dwight, Illinois

6 Ft. LONG

GIVEN

Boys! Here's the great Navy model Airship. Large 6-foot air bag with inflators, parachute with automatic release and complete instructions for flying. Will fly for miles at height of 1000 feet. Great chance to study aerial navigation. Send name and we'll send 6 of our new art pictures to dispose of on special 25c offer. Send the $1.50 you collect and as a reward for this service we will send this wonderful Airship with full instructions free.

C. M. THOMAS, 337 W. Madison St. 8K91 Chicago

How To Secure A Government Position

Why worry about strikes, layoffs, hard times? Get a Government job! Steady work, travel, good pay. I'll help you become a Custom House Clerk, Railway Postal Clerk, Post Office Clerk, City Mail Carrier, Rura Carrier—or any other Government job you want. I was a Secretary-Examiner of Civil Service Commission for 8 years. Have helped thousands.

Now FREE

My 32-page book tells about the jobs open—and how I can help you get one. Write TODAY, ARTHUR R. PATTERSON, Civil Service Expert, PATTERSON SCHOOL, 88 Wisner Building, Rochester, N. Y.

Make $80 a Week

with New Educational Invention

Proctor earned $538 cash bonus in 1 month. Freitag $500 in 30 days. McKean $20 profit in ½ day. You can do as well. Just help me introduce Playbox. Huge demand. Selling Outfit FREE. Write today for new Profit-Sharing Plan. J. L. Rector, Sec'y.

THE PARENTS ASSOCIATION
Dept. 1938 Pleasant Hill, Ohio

I POSITIVELY GUARANTEE

to increase your arms one-half inch in size, chest one full inch, strength 25%, health 100% in one week's time, by following my instructions and using my exerciser 10 minutes mornings and at night. Send $1 for complete course and exercisers. Satisfaction guaranteed or $1 refunded.
Prof. J. A. DRYER, Box 1850-P, Chicago, Ill.

NO JOKE TO BE DEAF

—EVERY DEAF PERSON KNOWS THAT

I make myself hear, after being deaf for 25 years, with these Artificial Ear Drums. I wear them day and night. They stop head noises and ringing ears. They are perfectly comfortable. No one sees them. Write me and I will tell you a true story, how I got deaf and how I make you hear. Address

Medicated Ear Drum

GEO. P. WAY, Artificial Ear Drum Co. (Inc.)
80 Hoffman Bldg., 2539 Woodward, Detroit, Mich.

BUCHSTEIN'S FIBRE LIMB

Send for Catalog Today

is soothing to your stump—strong, cool, neat, light. Easy payments. Braces for all deformities.
D. BUCHSTEIN CO.
610 3rd Ave., So.
MINNEAPOLIS, MINN.

GRAY HAIR

NO DYE! — NEW unusual discovery. For men and women. Quickly restores original youthful color. Youthray is not a dye. Applied to scalp. Excellent tonic and Hair Restorer. Ends falling hair and dandruff. Stainless. No one will know you use it. Results guaranteed. Get booklet and free trial offer today.
RAY LABORATORIES, 648 N. Michigan Ave., Dept. 67C, CHICAGO, ILL.

Beautify your NOSE

to shapely proportions—while you sleep!

Gold Medal Won 1923

ANITA NOSE ADJUSTER is SAFE, painless, comfortable. Speedy, permanent results guaranteed. Doctors praise it. No metal to harm you. Small cost. Write for FREE BOOKLET

BEFORE-AFTER

ANITA INSTITUTE, 812 Anita Bldg., NEWARK, N. J.

"Bud" Gurney, Successor to Col. Chas. A. Lindbergh as our Chief Air Mail Pilot and Instructor

Air Mail Pilots Teach You to Fly

How would you like to learn flying by the same thorough system taught in the U. S. Army Schools, *without* their strict discipline? That is how you learn at the Robertson School of Aviation.

And, think of it! When you reach the Advanced Class, you are instructed by U. S. Air Mail Pilots—men who regularly fly the St. Louis-Chicago mail, with a two-years' record of 98% *on time.*

We choose our flying instructors wisely. Col. Lindbergh, himself, was our Chief Air Mail Pilot and Instructor. His worthy successor is "Bud" Gurney.

You'll feel safe at this school, with 10 Licensed Transport Pilots on its teaching staff—a fleet of new and modern planes, government licensed and inspected—over nine years' operation *without accident.* We ask no bond—make no charge for breakage.

Flying instruction *includes* excellent technical Ground School Course; also unlimited shopwork. Mahoney "Ryan" and Curtiss "Robin" factories on field. Lambert-St. Louis Field is center of transcontinental air traffic.

9½ Years — 550 Graduates — No Accidents

Robertson Flying Services, *Inc.* Dept. P

Affiliated with Robertson Aircraft Corporation

Operators St. Louis-Chicago Air Mail Route
Lambert-St. Louis Flying Field, Anglum, St. Louis Co., Mo

If you expect to become a flyer, read our inspiring new book:

"Making Good in Aviation"

Includes interesting story of Col. Lindbergh as our Air Mail Pilot. Fine illustrations—helpful information.

Price 25c—Stamps or Coin

747M

I Will Teach You the Secrets of HYPNOTISM —or no cost

I'll show you in a few hours how to use the strange, mysterious power of hypnotism to help you to master every situation, or the 5-Days' Trail is FREE!

There is nothing uncanny, weird or malign about the amazing power of hypnotism! Everyone has concealed in his or her make-up the germ of this mysterious power. All you need to do is to train it properly. Then, when this mighty power is released, it will help you to overcome obstacles, and to gain popularity, success, big money.

When you have this marvelous power at your command, you can work wonders. You can strengthen your own will-power; develop a magnetic personality; banish fear and worry; improve your memory; overcome bad habits; realize ambitions; increase your earnings. If you have an average active and intelligent mind, you should easily learn the secrets of Hypnotism.

All is now revealed in a wonderful book, Practical Lessons in Hypnotism, by L. W. de Laurence, a world famous hypnotist. In simple, easy-to-understand language, de Laurence explains the theory and practice of Hypnotism —how to master this power, how to select your subjects, how to hypnotize your subject, how to hypnotize by telephone, mesmerism vs. hypnotism, magnetic healing, various methods of hypnotizing, how to wake up the subject, how to make money out of hypnotism, and scores of other secrets. Prepared especially for self-instruction. This course should give you new power, confidence, and a more dominating personality.

Mysteries of Hypnotism Revealed

—How to hypnotize at a glance.
—How to gain confidence.
—How to wake a subject.
—How to hypnotize by telephone.
—How sickness is cured by hypnotism.
—How physicians use hypnotism in operations.
—How to cure bad habits.
—How to induce hypnosis.
—How to use thought transference or telepathy.
—Duration of Hypnotic Sleep.
—Susceptible subjects.
—Methods of Fascination.
—How to give an entertainment.

Try 5 Days Free
Send No Money

Thousands of people have learned the secrets of Hypnotism from de Laurence. So confident are we that his great book will teach you the amazing science of Hypnotism, that we will send you a copy without one cent in advance. Simply clip and mail the coupon. When the package arrives, pay the postman only $2.50, plus the delivery charges. Inspect this revealing volume. Test the powers of hypnotism for five days. Then if you are not delighted, return the book and your money will be refunded immediately. Mail the coupon now as we have but a limited edition at this low price. Franklin Publishing Company, 800 North Clark Street, Dept. K-70, Chicago, Ill.

Franklin Publishing Company,
800 N. Clark St., Dept. K-70,
Chicago, Ill.

Please send me your amazing course, Practical Lessons in Hypnotism, by L. W. de Laurence. When the book arrives, I'll pay the postman only $2.50 plus delivery charges. If I'm not satisfied after 5 days' trial, I may return the book and you are to refund my money.

Name.....

Street & No.....

City.....State.....

If you may be out when postman calls, send $2.50 with coupon and we'll pay the postage.

AVIATION NEEDS MEN!

and There Is Money for YOU If—

You Get THOROUGH TRAINING NOW!

There is honor and prosperity ahead for those who start now with the proper training and grow with Aviation. Our courses will give you this training—they cover EVERYTHING about planes, motors, their maintenance and construction, etc. EVERYTHING a pilot or mechanic must know to secure a good paying position.

WE TEACH YOU BY PRACTICAL TRAINING
Our School Registered, All Instructors and Airplanes Licensed by U. S. Government

Realizing that the highest type of equipment and ablest and most experienced instructors are necessary, our courses are taught under the direction of U. S. Licensed Transport Pilots and Mechanics. Our equipment is new and of modern design, every ship is licensed and instructors and all equipment subject to daily U. S. Government Inspection. (This school has a resident Federal U. S. Government Inspector on the field—think what this means to you.)

THOROUGH INSTRUCTION AT LOW COST

We teach by actual flying and practical instruction; no long course needed. We guarantee sufficient hours in the air to make each student master of his ship; pilot it safely and efficiently without assistance. No student bond required. Our ground course gives thorough instruction in ground work and will qualify you for any ground position or you can take the course combining ground instruction and flying which will qualify you for a private, industrial, or limited commercial pilot. The cost is low considering daily flying and thoroughness of theoretical and ground instruction on latest modern type planes, Wright Whirlwind and other standard motors. Our big new book "Aviation and You" tells all the facts. Write for it NOW—it is FREE.

VON HOFFMANN AIRCRAFT SCHOOL
109 Lambert—St. Louis Flying Field, ANGLUM, MO.

WHY PAY BIG OIL BURNER PRICES?

THE LACO Heats Better-Cheaper

7 SIZES

The LACO OIL BURNER is made in seven sizes—each the lowest priced in its size. There is nothing to get out of order; it is practically noiseless; will not interfere with radios. The upkeep cost is kept low because of the relative freedom from trouble and servicing plus the economy of fuel.

The LACO is as safe and simple as a gas stove . . . and built to operate continuously without overheating. Write today for complete information.

DEALERS

Write for LACO sales opportunities. Give your customers automatic, clean, odorless heat, at lowest cost and upkeep.

Made in seven sizes. Priced from $125.00 to $475.00.

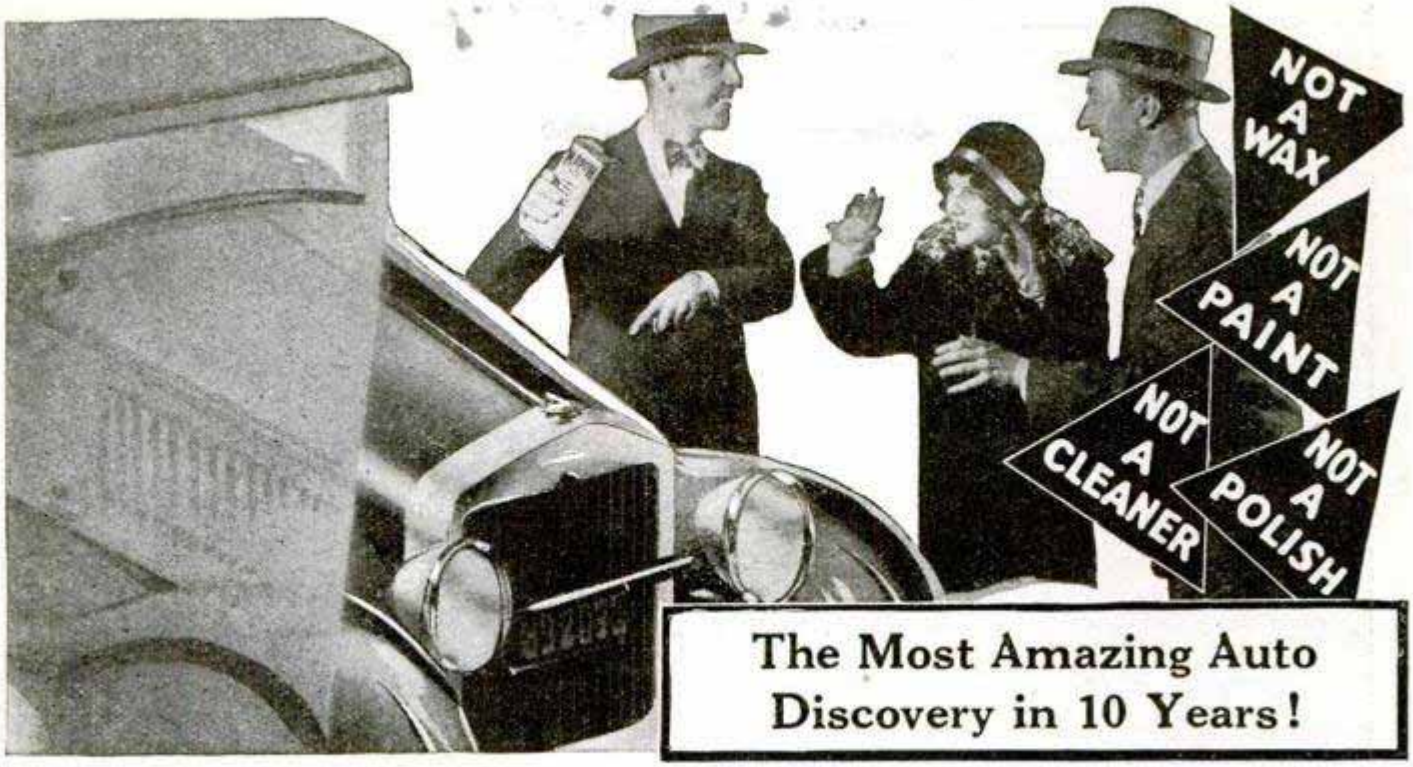
LACO GAS BURNER CO., 110 Union St., Griswold, Iowa, U. S. A.

Learn Watchwork, Jewelrywork and Engraving A fine trade commanding a good salary, and your services always in demand. Address **Horological,** Dept. P, Bradley Institute, PEORIA, ILLINOIS, for our latest catalog.

$2.00 BOOK for 25¢

"Look—look!" she gasped. Pale with horror, she recalled from the desk. King's face was bloodless, the eyes glazed and staring. It was the face of a dead man. The entire story of "The Crookshaven Murder" **complete** in the current issue of **Complete Detective Novel Magazine.** A full booklength ($2.) novel for 25c. Now at all news stands, or, send 25c for your copy to:-

COMPLETE DETECTIVE NOVEL MAGAZINE
225 VARICK ST. Dept. 504, NEW YORK, N. Y.



The Most Amazing Auto Discovery in 10 Years!

Astonishing Magic Fluid Restores Original Finish To Old Cars *in 60 Minutes!*

THINK of it! Old cars restored to their original color and show room lustre. Just a sweep of your hand—and the dullest surface becomes a thing of beauty! This remarkable fluid discovery actually *draws forth* the original color and lustre of any kind of finish—whether painted, lacquered or enameled.

For **NAVON** is truly "liquid Magic"! Experts call it "the most surprising auto discovery of the decade." It is not a wax . . . not a polish . . . not a cleaner . . . not a paint! Nothing like it has ever been seen before. Yet its results are as *lasting* as they are astonishing!

Works Like a Charm

But perhaps best of all is the ease with which **NAVON** can be applied. You just put it on the car right out of the can—guiding its flow with a pad of cheese cloth. No fussing with brushes or tiresome rubbing. (It's more like pleasure than work—especially when you see your car actually regaining its original color and mirror-like gloss right before your very eyes!) . . . And then before you realize it, the trick is done! There stands your old car, glistening with its new coat of **NAVON** like the day when you first climbed back of the wheel and pushed the starter button!

Safe—Durable—SURE!

Results with **NAVON** are absolutely certain! You don't have to be an expert to get 100% perfection. It's almost as easy as washing—dries smooth as glass without streaks. No harmful ingredients. Resists wear and weather. Can't crack or peel—and lasts for *months!* Ends need for bothersome polishing and users write that it increases re-sale value $150 or more!

Test It Without Risk!

Right now we are making a special introductory offer which allows you to test **NAVON** without risking a penny! See for yourself what this amazing discovery can really do! No obligation. Just clip the coupon below and mail it to-day!

AGENTS!
$100 to $300 A WEEK

So astonishing is **NAVON** that demonstrators and agents everywhere are simply coining money for just a few hours' work. H. Geiss (Ill.) cleared $300 in a single week! And J. Porter (Wisc.) made $98 in one day!

All you have to do is let car owners see what **NAVON** does! 9 out of 10 want to order instantly! And every order means *real cash* in your pocket! Even spare-time workers often make $10—$25 on Saturday afternoons, etc., just showing **NAVON** to friends, neighbors, etc. Wonderful opportunity to build permanent, profitable business as **NAVON** Service Station Operator, too. Write to-day for generous offer to order-takers —and extra-special test offer for agents! Check bottom line of coupon and mail it now!

NAVON
INSTANT REFINISH FOR ALL SURFACES

FLOWS ON—STAYS ON—EASY TO APPLY

Consolidated Specialties Corp.
21 W. Elm St., Dept. 56-K, Chicago, Ill.

Mail This NOW!

Consolidated Specialties Corporation (NAVON Division)
Dept. 56-K, 21 W. Elm St., Chicago, Ill.

Without obligation, send me particulars of NAVON, together with NO-RISK 5-TEST OFFER.

Name.....

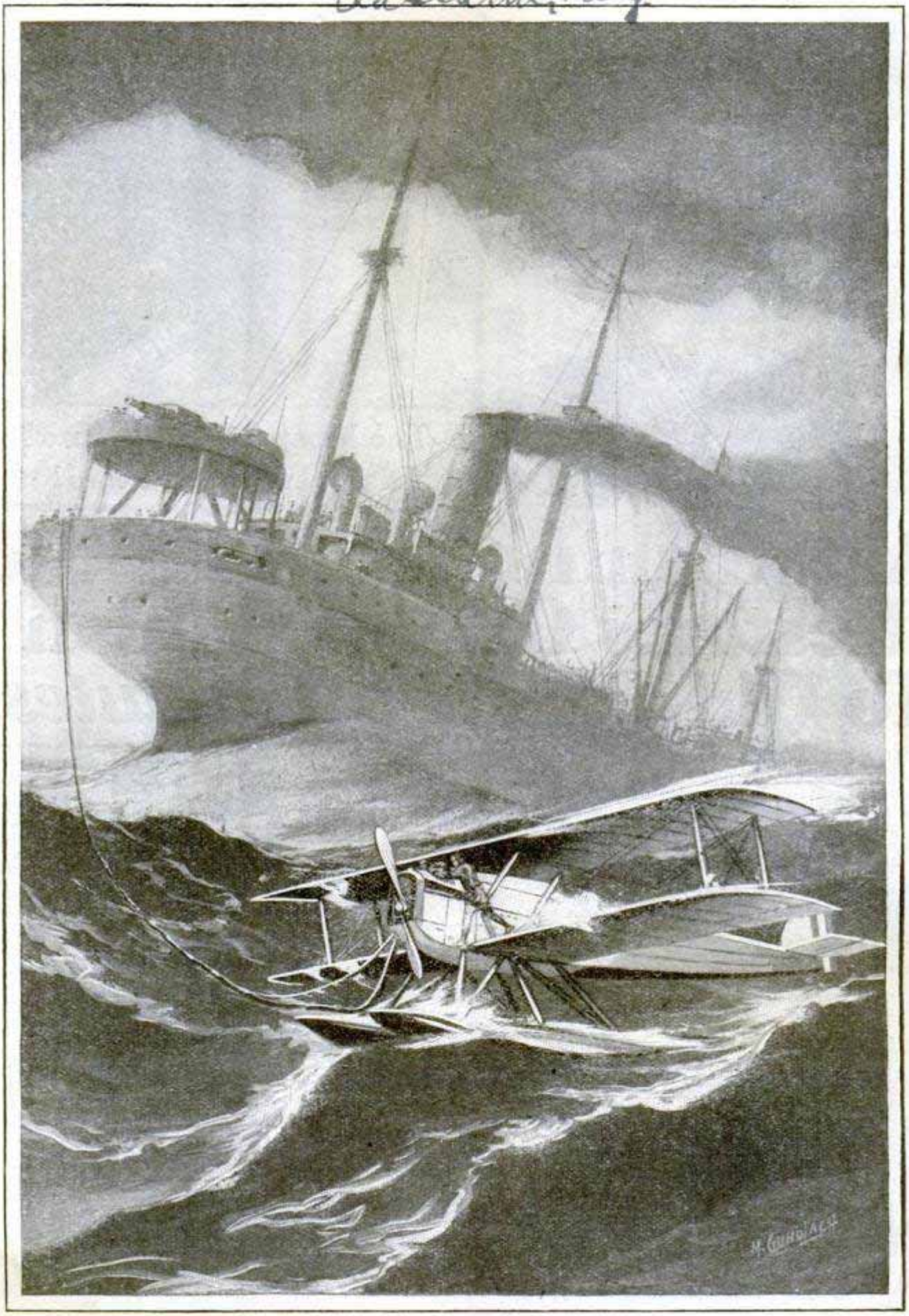
Address.....

Town.....State.....

( ) Check here if interested in NAVON as a money-maker.

Mr. A. R. Spencer,
331-34th St
Oakland, Calif

426



Navy Experiments in Refueling Surface Ships and Airplanes at Sea Have Been So Successful That the Cruising Radius of the Two Fleets Is Extended Indefinitely, a Recent Announcement Said; Special Fuel Lines and Equipment Make It Possible to Refuel Even in Fairly Rough Weather

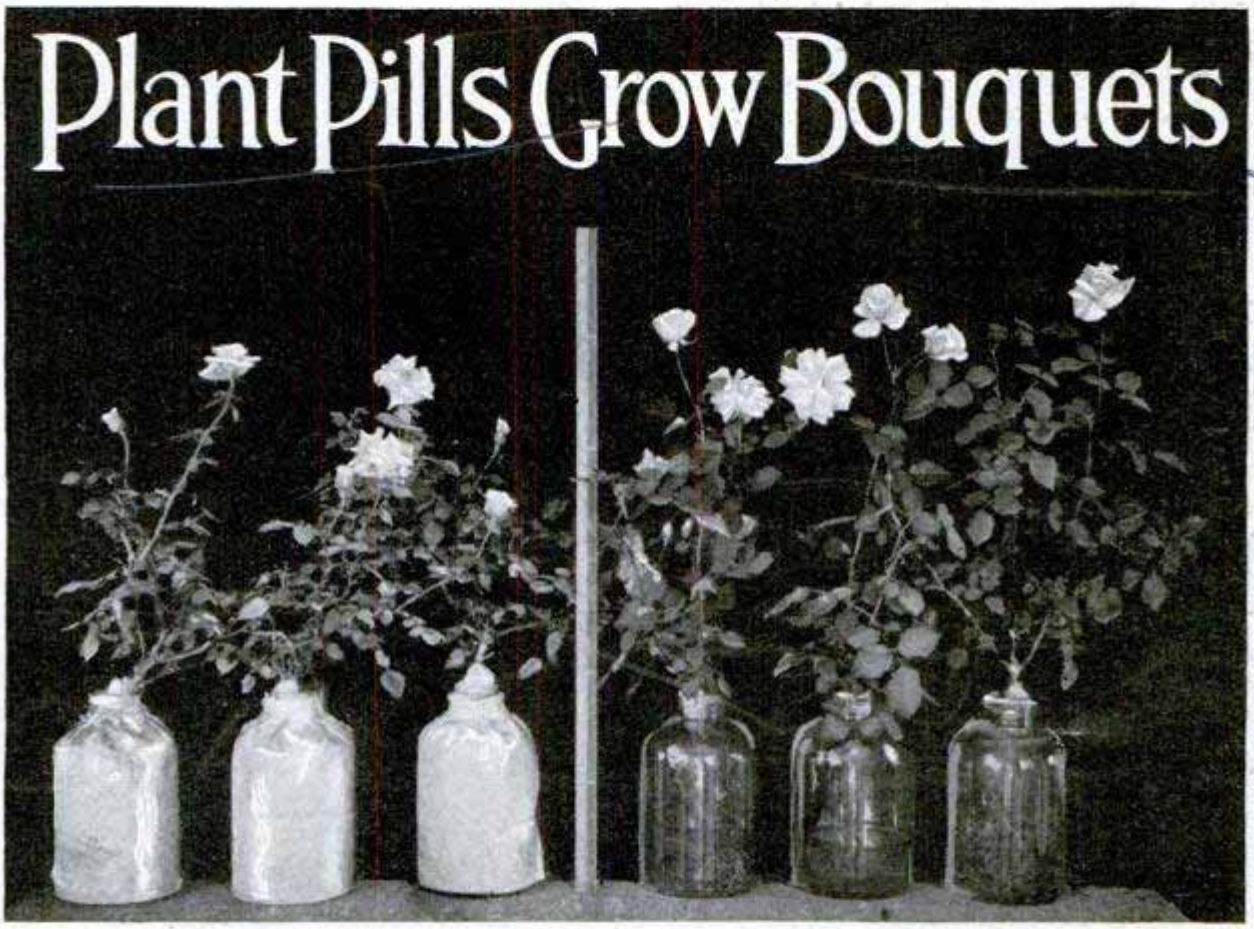
Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 50 AUGUST, 1928 No. 2

Plant Pills Grow Bouquets



Rose Cuttings, without Roots, after Growing Four Months in Bottles of Water to Each of Which a "Plant Pill" Had Been Added; the Cut Stems Have Developed Good Root Growths

By H. H. DUNN

AMATEUR gardeners may throw away their spades and forks, trowels and watering pots, and produce their own flowers, any month in the year, in window boxes, jars, tin cans, or any other receptacle that will hold water. In a box, the width of an ordinary apartment-house window, half a dozen rose cuttings, clipped from the parent bush in August, will supply blossoms for the Christmas table.

Sweet peas, planted in jars in the fern box on October 1, will provide abundant bloom for New Year's day. Dahlias, zinnias, asters, chrysanthemums, pansies, phlox, stocks, or whatever flower one desires, may be made to bloom in a similarly short time, indoors, all the year around.

No soil is required, no fertilizer is needed. The secret is a small, white oval lump of the size of a pigeon's egg, that is to say, about two inches long by an inch in diameter, called a "plant pill," soon to be obtained from the nearest druggist at small cost compared with what one pays for cut flowers at midwinter.

This wonder worker among flowers is the product of some seven years' study by Dr. W. F. Gericke, of the University of California. More than 200 varieties of plants, numbering nearly 2,000 individuals, have been made to produce their blos-

R33

soms at any selected date, indoors and out, at the university.

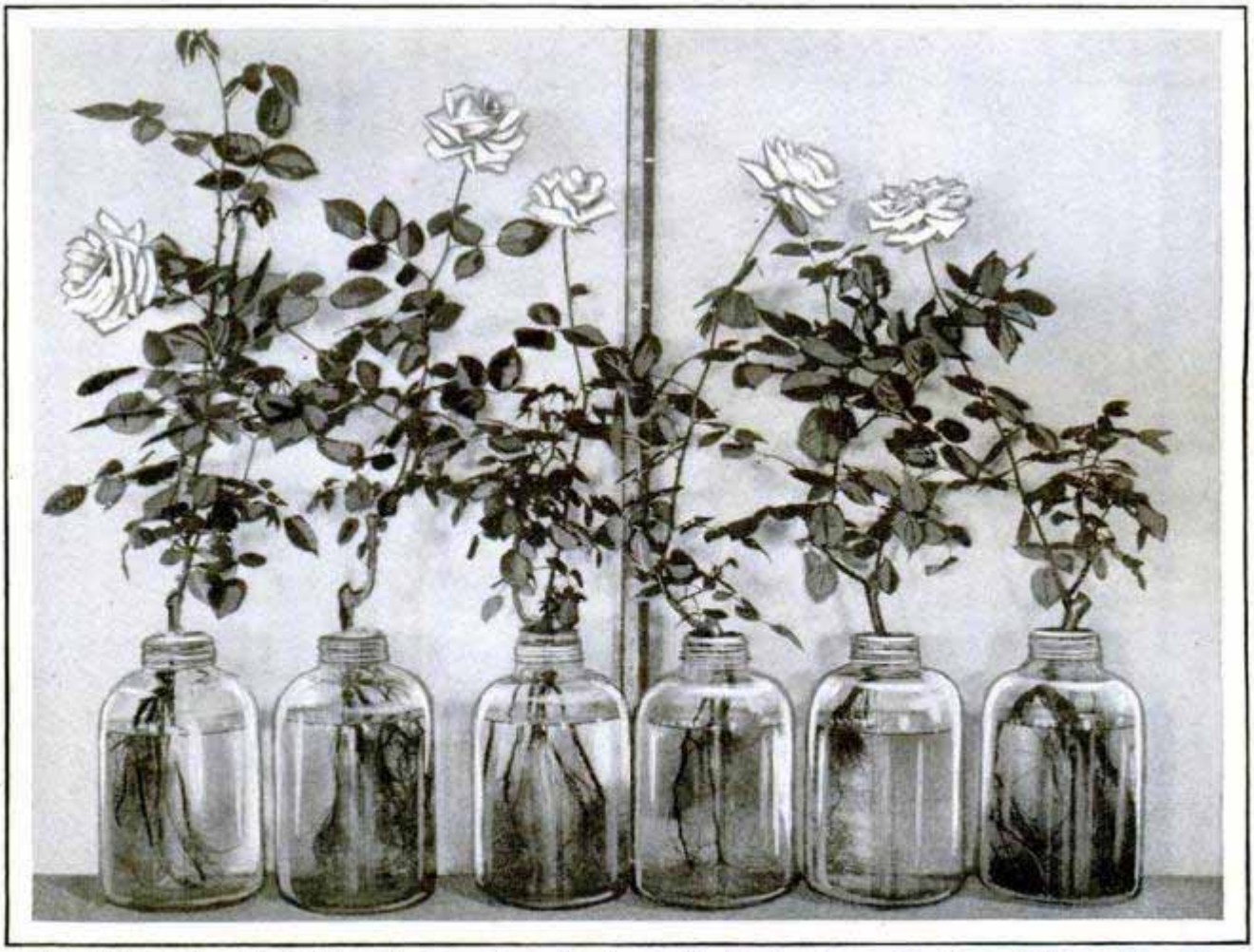
In addition to flowers, any other plant which is transferred from seed bed to garden or field, can be so controlled by starting the seeds in water containing the pill. Thus, indoor vegetable gardens can be made to produce virtually all year.

But the greatest value of the discovery, as so far applied, is in the production of flowers for the home in defiance of winter temperatures outside. The normal warmth at which most houses are kept during cold weather is ample for the growth and blossoming of the plants under the urge of the chemicals in the pill.

In the case of roses for the home indoor garden, cuttings are taken from the bushes in August, or any other summer month, and placed in two or one-quart glass jars, as space may allow, or in tin cans. The open top of the jar is covered with a cork or cardboard, cut to the shape of the jar, through which the stem of the cutting is passed, permitting the lower end to rest on the bottom of the jar, the top, with its leaves, extending well up into the open air.

The jar is then filled from half to three-quarters with water, and the height of the water marked on the outside of the jar, so that it can be maintained by additions as evaporation and absorption lower the level. The water is never changed, merely added to. Either before or after putting in the water, the pill is dropped in, one being sufficient for each plant up to and through blossom time. The period required for root growth and blossoming has been calculated exactly for more than 200 varieties of flowering plants, and varies materially, the range being sixty days to nearly six months.

Rose cuttings which have been planted with the pill in August will be ready for Christmas cutting. Cuttings for November should be made in July; those for January, in September; for February in October, and so on. Cuttings made later than October, in regions where winter is severe, will not produce blossoms so quickly, nor of such large size, as those

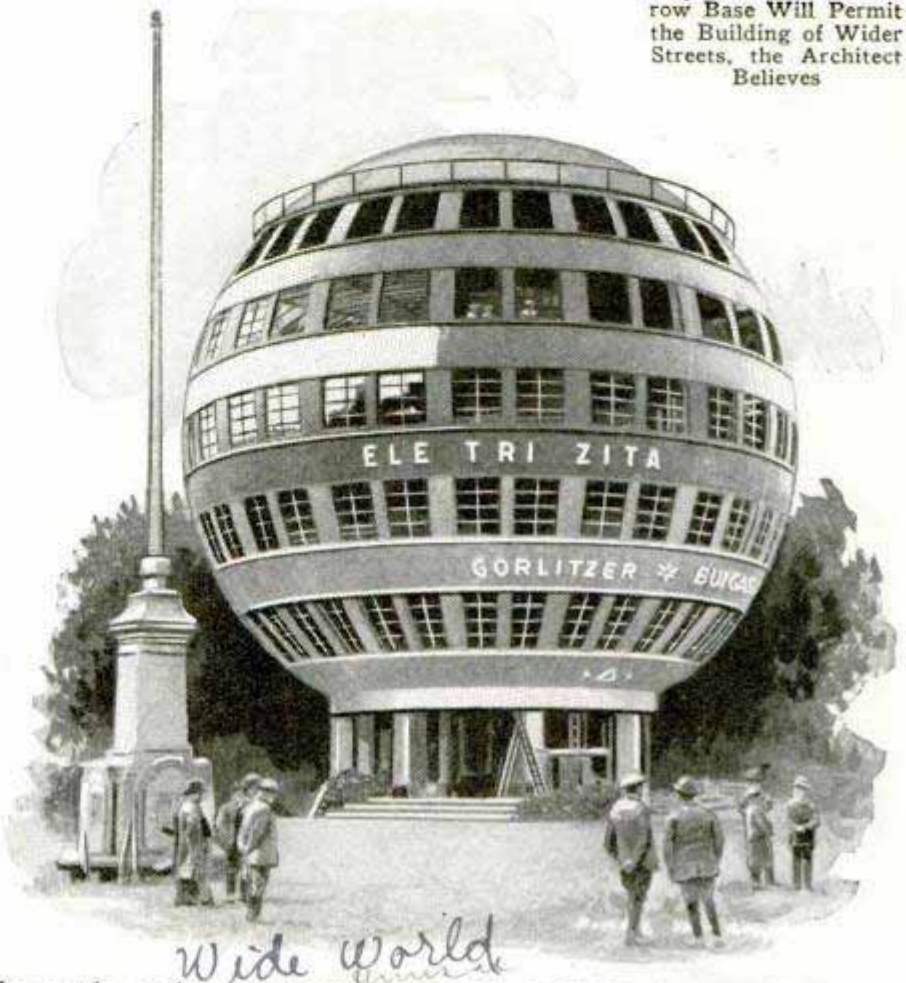


Nine Weeks' Growth of Columbia Roses from Cuttings Eight Inches Long; No Part of These Flowering Plants Has Ever Touched the Soil, Despite the Well-Developed Roots

taken from April to October. These cuttings, which have blossomed with the help of the plant pill, may be transplanted to the garden in springtime, and have been found to be far ahead of other plants of the same kind and age originally rooted in earth.

Annuals, such as sweet peas, zinnias, asters, pansies, and many others, may be controlled and made to blossom at any time in the same way. The seeds are planted, either in the ground, at midsummer, in shaded seed boxes, and, at transplanting time, transferred to the water jars containing the plant pills, or, if soil facilities are not available, on the flat surface of a piece of cork, floating in the water in the jar. There they sprout, and the first rootlets get immediate benefit from the solution. Sweet-pea vines, five and six feet in height, loaded with blossoms, have been grown in sixty to ninety days by this method, the longer period being for those whose seeds were started in the earth.

Globe-Shaped Building Exhibited at German Exposition; the Narrow Base Will Permit the Building of Wider Streets, the Architect Believes



Wide World

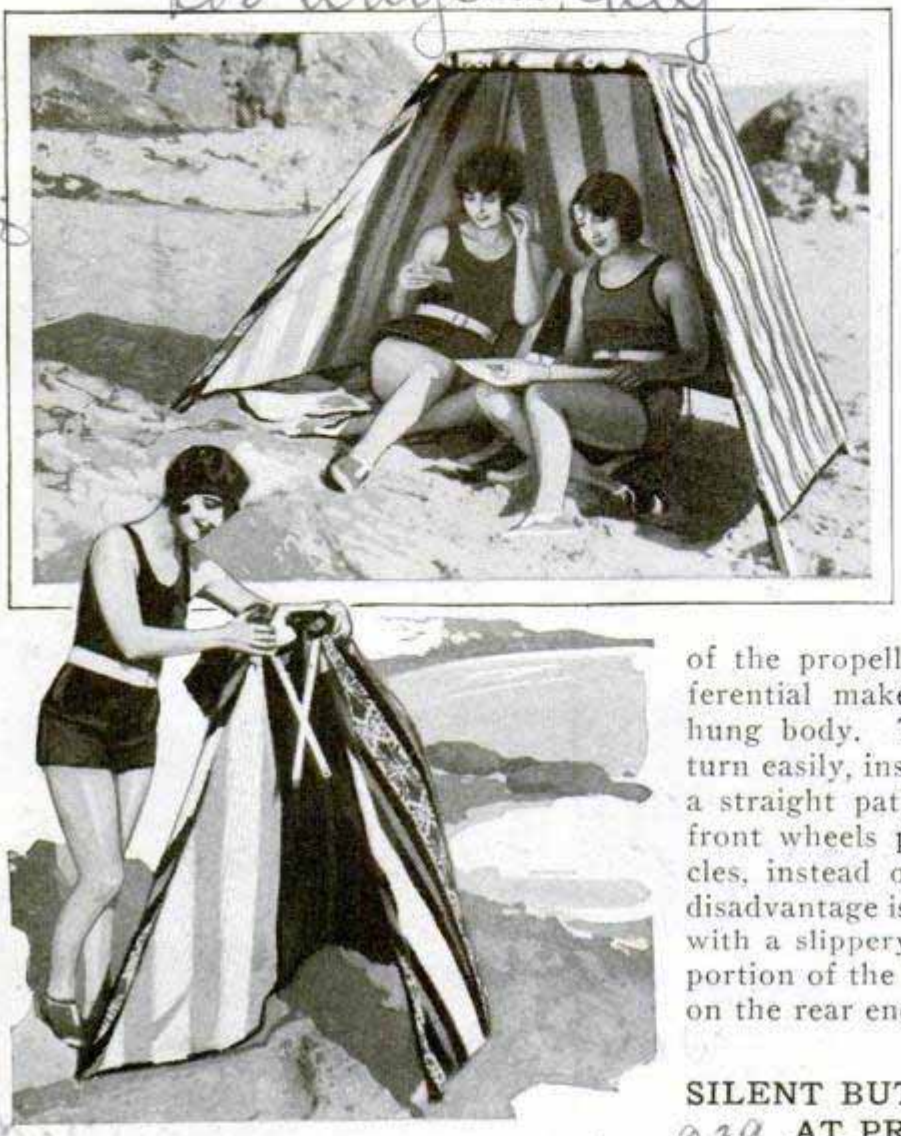
HOUSES IN FORM OF SPHERE TO AID TRAFFIC

Streets much broader than are permitted at present can be laid out by making the houses and buildings in spherical fashion, as shown at a recent German exposition, the architect who originated the design declares. Means for better ventilation and lighting and a less obstructed view from various parts of the structure are also provided. The model house was ninety-eight feet high, eighty-two feet in diameter and rested on a base sixteen and one-half feet wide. The four lower stories were devoted to business offices. The upper part contained a restaurant and cafe, and an outlook balcony. The skeleton of the building was of steel.

HOOK TO STRAIGHTEN FENDERS REDUCES REPAIR COSTS

To remove the kinks in damaged fenders, a steel bending bar with a hook at one end and a self-leveling leather-covered pad and hook at the other, may be used by almost anyone, it is reported. The close-bent hook is designed especially for straightening up the fender flange, while the other end makes it easy to pry the fender away from the tire.

Removing Kinks in Fender Flange with Straightener



Pitching the One-Piece Beach Tent and View of It Open, Showing Roomy Interior

ONE-PIECE TENT FOR BATHERS EASY TO PUT UP

Weighing but a few pounds and fashioned in one piece, so that it can easily be folded up and carried, a tent for the beach provides effective shelter from the sun and winds and may also be used as a playground tent. The top "jackknives" and folds in a single operation, and the material is furnished in attractive strips of various colors.

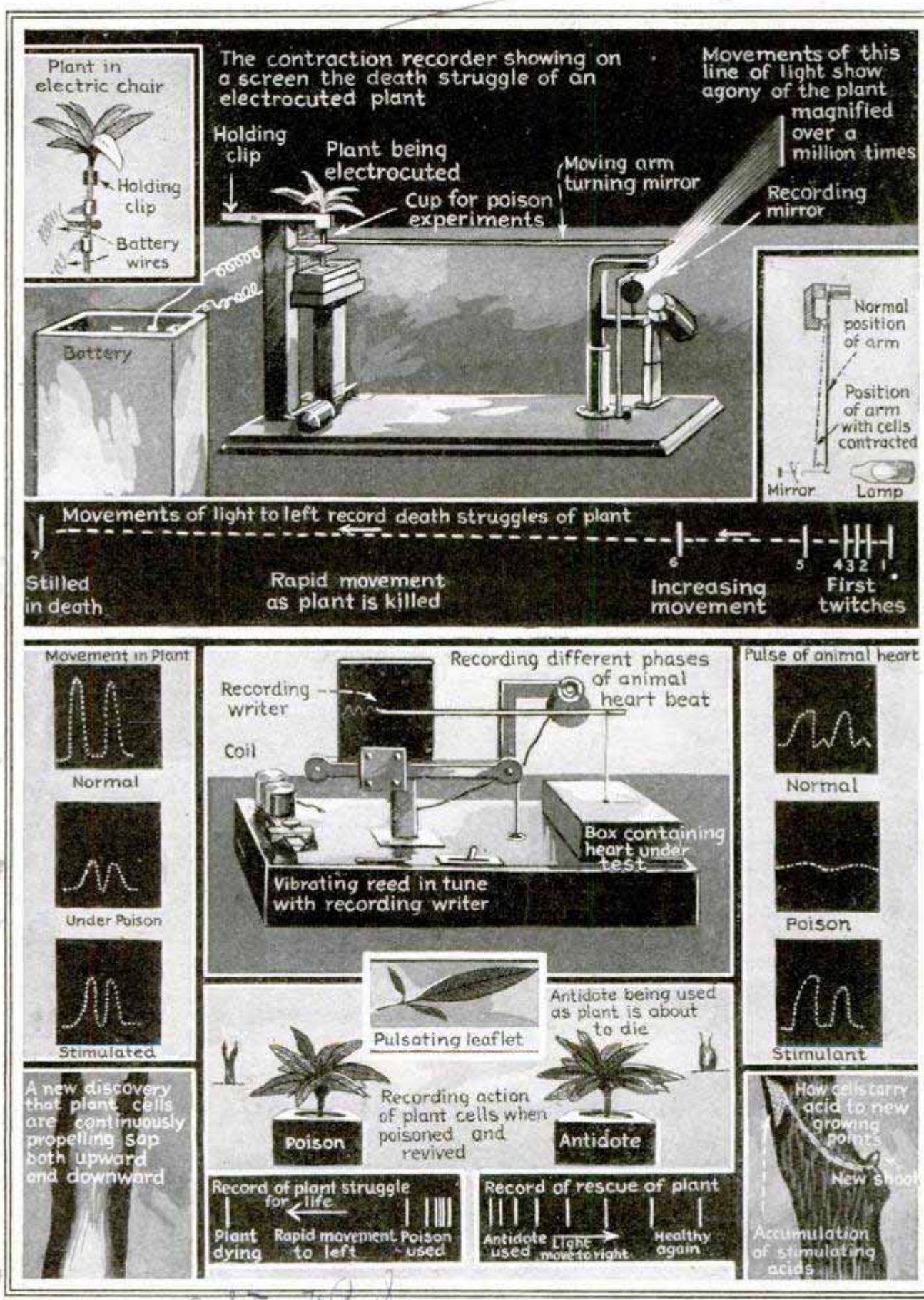
FRONT-WHEEL DRIVE ADAPTED FOR PLEASURE CARS

Front-wheel drive, developed with success for racing, is being tried out in Europe for pleasure and commercial cars. The advantages of driving through the front wheels instead of the rear ones outweighs the mechanical difficulties of transmitting power to steerable wheels, engineers believe. The chief advantage claimed is that the power is always being transmitted in the direction in which the car is moving. When a rear-drive car turns, the propulsive force is being exerted in one direction, while the steerable wheels are turning it in another, a fact that is responsible for upsets when high-speed turns are attempted. Another advantageous feature is that the absence of the propeller shaft and rear-axle differential makes possible a much lower-hung body. The front-wheel drive cars turn easily, instead of fighting to continue a straight path, and on rough roads the front wheels pull themselves over obstacles, instead of digging into them. One disadvantage is encountered on a steep hill with a slippery pavement, for the greater portion of the car's weight is then thrown on the rear end.

SILENT BUTLER ANSWERS DOOR AT PRESS OF BUTTON

Duties of a servant are duplicated in an electric door announcer devised for the convenience of the home owner and the caller. Answering a summons at the door, the occupant of the house simply presses a button which flashes an electrically lighted sign reading, "one moment please" or, "I'll be down in a minute." In addition the announcer is set to show a green signal, "in," if the person is at home. A red signal, "out," is displayed if the occupant is not at home. The attachment is not difficult to install, is rather decorative and occupies but little space on the door.

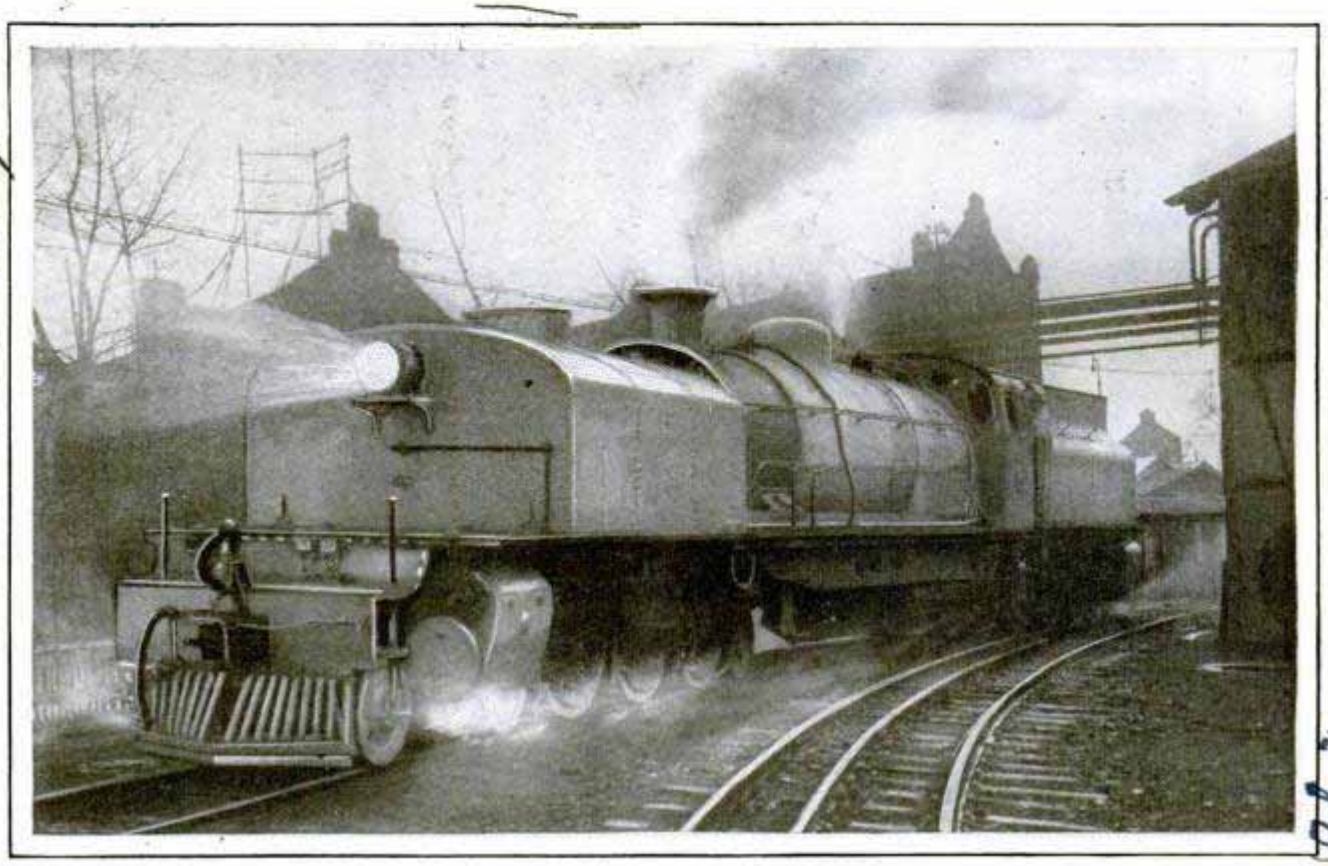
ELECTROCUTING PLANTS AS AID TO MEDICINE



Courtesy The Illustrated London News

Sir Jagadis C. Bose, the Indian Scientist of Calcutta, in a Recent London Lecture Demonstrated That Plants, Animals and Humans Have Characteristics **in Common, and Respond in the Same Way to Electrocution, to Poisons and to Antidotes Administered to Counteract Poisons**

THREE-SECTION LOCOMOTIVE MAKES SHARP TURNS



Three-Unit Locomotive That Can Make Sharp Turns on Railroads in South Africa; Note Position of the Driving Wheels under the Pilot Section and the Tender

A three-section locomotive, designed to negotiate unusually sharp curves, has been developed in Germany for the South African railways, and forty of them, part of standard gauge and part for the narrow-gauged lines used in much of the African system, have been built. The engine is unusual in that the drivewheels are not under the boiler and cab, in the usual place, but instead are under the pilot and the tender. The boiler and cab are suspended between them, with a pivot at either end. The pilot section, with its two cylinders and six drivewheels, carries the water tank, and the tender, also with a pair of cylinders and six driving wheels, holds the coal supply. The standard-gauge locomotive can turn a curve of less than 300-foot radius and the narrow-gauge engine one of about 200-foot radius.

KITCHEN RANGES IN COLORS ADD CHEER TO HOME INTERIOR

Color, the dominant idea in modern home decoration, has made further conquests in one of the last rooms to be changed in this respect—the kitchen. Ranges in a wide variety of hues, from blues and grays to greens and tans, are now available. They are porcelain-enamel coated, making them more easily cleaned, and the substance is said not to chip, flake or crack. Heating cabinets in colors and in finishes to harmonize with the rest of the room have also appeared to replace the unsightly black stove.

AUTOMATIC KNIFE SHARPENER GIVES KEEN EDGE

Designed especially for hotels, meat markets and restaurants, a knife sharpener, recently introduced, requires no skill to operate and is said to produce a keen edge in a few seconds. The whetting is done between interlacing blocks of carborundum. The knife is simply forced down between them and removed a few times, the sharpening being effected by the action of the stones which are held close together.

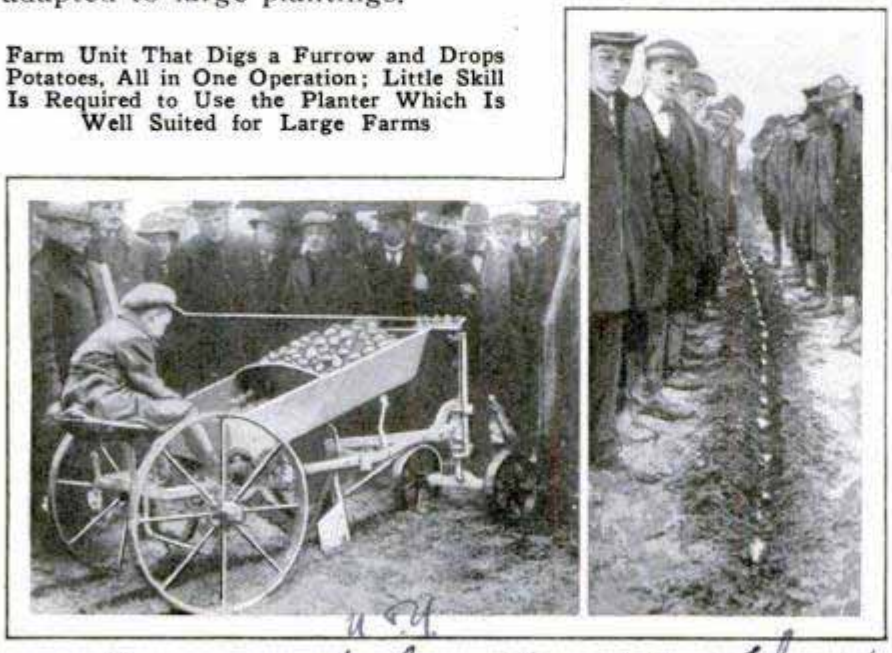
by springs. The latter can be adjusted for tension and regulated to suit blades of varying thicknesses and shapes.

FIFTY THOUSAND YEARS AGO

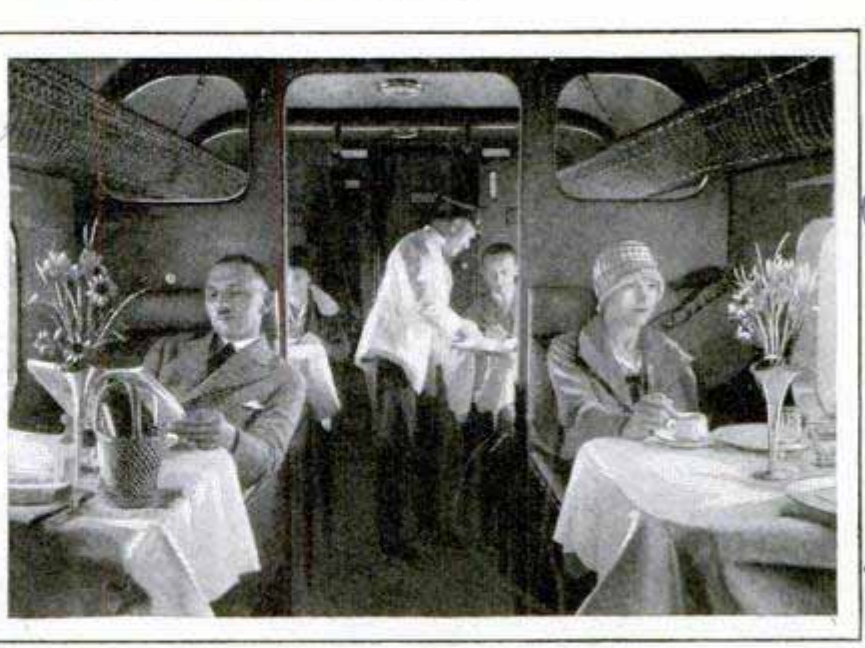
That men lived in northern Africa 50,000 years ago and were fond of oysters and clams, is the interesting evidence uncovered by Beloit college scientists who have been digging in Algiers. Under strata of earth, they discovered great mounds of the shells and below them were crude stone implements and weapons, indicating that the users must have lived at least 500 centuries ago. The find is regarded as especially valuable in that it offers further evidence in support of the belief that man probably lived many years in northern Africa before entering far into Europe.

PLOW THAT PLANTS POTATOES SAVES HAND LABOR

Farm experts in Holland have introduced a planter that plows a furrow and drops potatoes at regular intervals, all at the same time. The unit performs the work of several men and is especially adapted to large plantings.



Farm Unit That Digs a Furrow and Drops Potatoes, All in One Operation; Little Skill Is Required to Use the Planter Which Is Well Suited for Large Farms



Dining Compartment of the "Hermann Koehl," a New Airplane in Service between Berlin and Paris

RESTAURANT IN THE CLOUDS SERVES AIR PASSENGERS

Airplane service between Paris and Berlin has been amplified by the addition of a ship equipped with a roomy dining room. Food is cooked before the journey and is kept hot and ready to serve in special containers. The plane has been named the "Hermann Koehl," in honor of the chief pilot of the recent "Bremen" flight.

GRAIN REGISTER TELLS EXACT AMOUNT OF CROPS

Attached to a combined harvester, an improved grain register is being used for weighing grain. It measures it somewhat after the manner of a water meter. It consists of a six-compartment rotor, revolving just slowly enough to allow each compartment to become completely filled. An automatic checking device stops the rotor whenever there is not enough grain directly over the rotor to fill the compartment. This enables a more accurate determination of the yield and the amount of the crop harvested.

892

Southern Cross

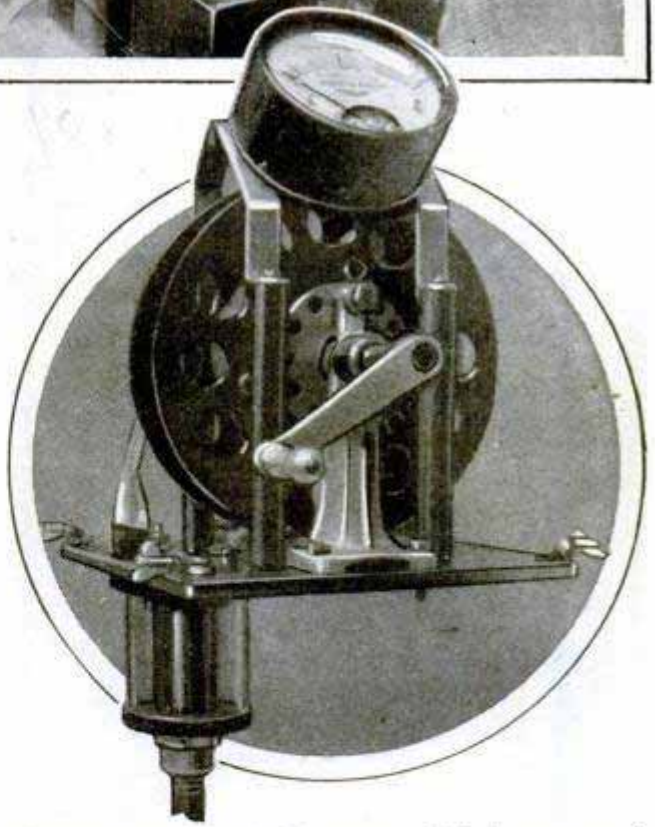
By RALPH M. HEINTZ

Builder of the "Southern Cross" Radio Sets

"GUESS we are lost!"

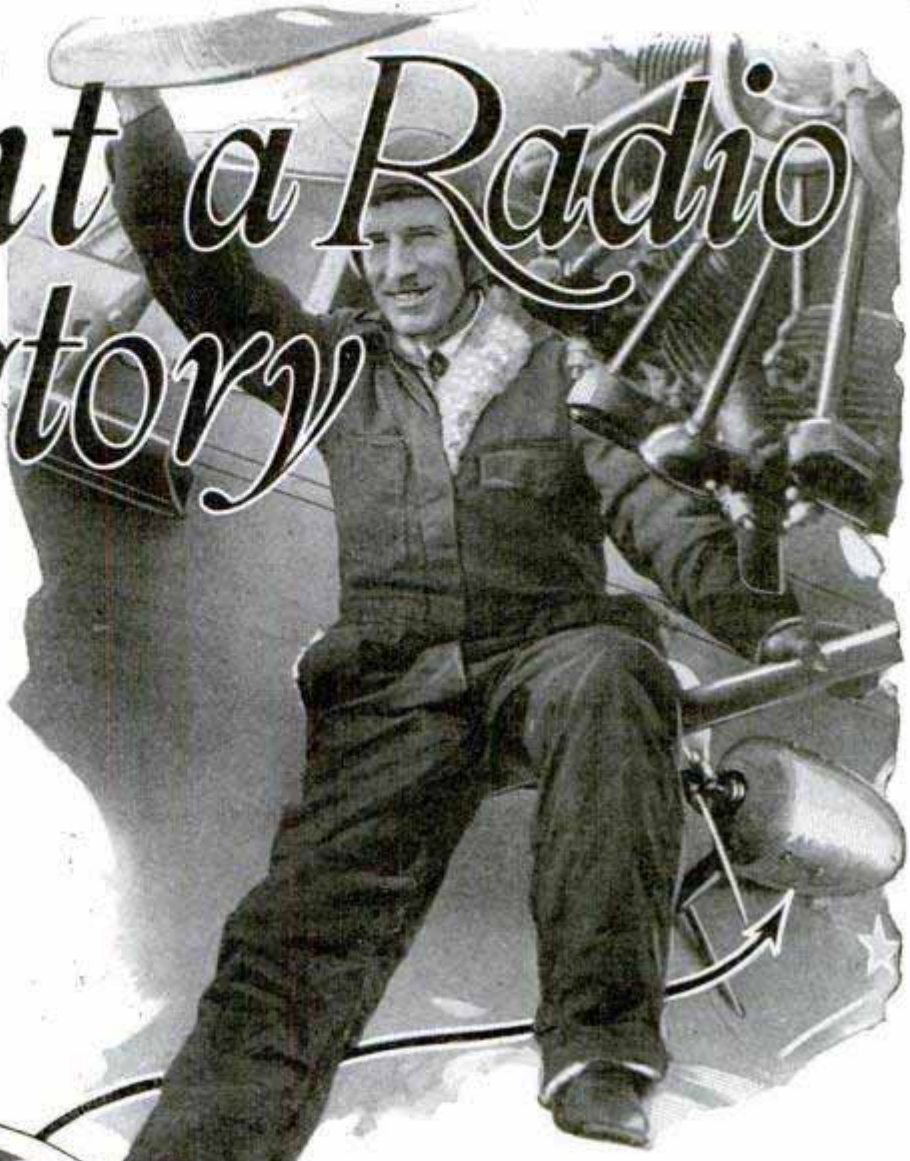
For more than twenty-four hours we had been standing by at the radio-receiving station in San Francisco, in constant communication with the "Southern Cross," as she flew like a homing pigeon straight from Oakland airport over the 2,418 miles to Honolulu. Back and forth, over the first short-wave set to meet such a grueling test, we had chatted with Jimmie Warner, radio operator on board the huge Fokker plane. All had gone well; all was going well, when, suddenly as a fire alarm, came that calm defiance of death: "Guess we are lost!"

Helpless, knowing that gasoline was low in the tanks of the man-made bird, we realized that the lives of four men hung on that little box we had so carefully built into the cabin of the "Southern Cross." But, far out on the Pacific, an American warship picked up that call. Another warrior of the sea heard it. Honolulu, waiting for the first flash of the sun on the metal nose of the air wanderer, got it. From three scattered transmitters, positions went to Warner, and in a moment came back over thousands of miles of sea:



James Warner, Radio Operator, at His Instruments in the Plane, and, Below, Reel for Lowering Aerial

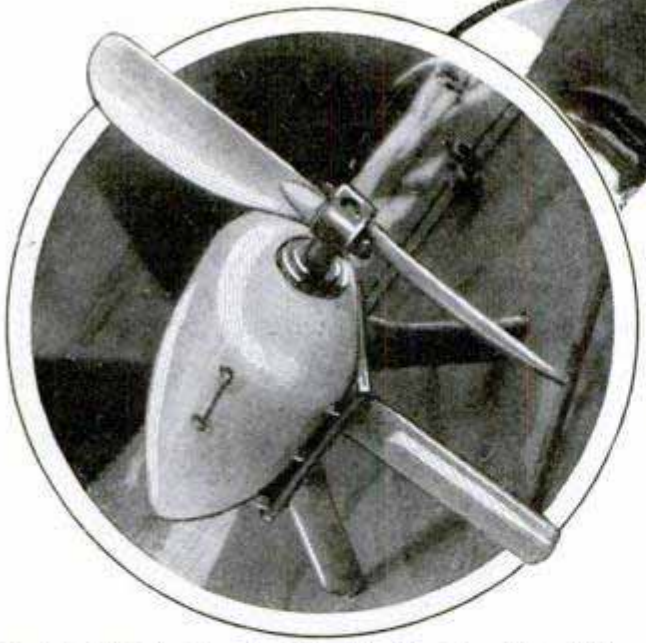
flight a Radio Victory



"OK. Off Hilo."

The smallest and lightest radio set ever installed in a plane on long-distance flight had saved ship and lives to set a record beyond anything yet attempted by daring birdmen.

Again, as equatorial storms tossed the seven-ton plane like a feather on its further southward flight, shore and ship stations picked up other fearless calls for position. With the aid of the replies, received by that tiny set, Navigator Lyon was able to learn that the "Southern Cross" had been flying in circles, sometimes back on its course, sometimes across it, and again straight toward the goal. Through the roar of the three 220-horsepower motors, and above the screaming of the wind through the rigging, came the points of position whereby the flyers were able to locate and redirect their winged Argosy.



Captain Charles Kingsford-Smith with One of the Wing Engines, and, Below, a Radio-Power Generator

Without radio, they would have been lost. Not only once, but three times, the new set, so small as to seem powerless, called on the world to help, and three times the world answered.

From the time that the "Southern Cross" rose from the field in California, we in the receiving station at San Francisco were constantly in touch with her until 9:30 a. m., of the following day, when she landed, at 12:20 p. m., on Wheeler field, island of Oahu. Meanwhile, only one and one-half hours after she left the Golden Gate, Honolulu stations picked up the "Southern Cross," and kept contact

with her until Warner pulled in his antenna about ten miles out from the successful ending of the first hop.

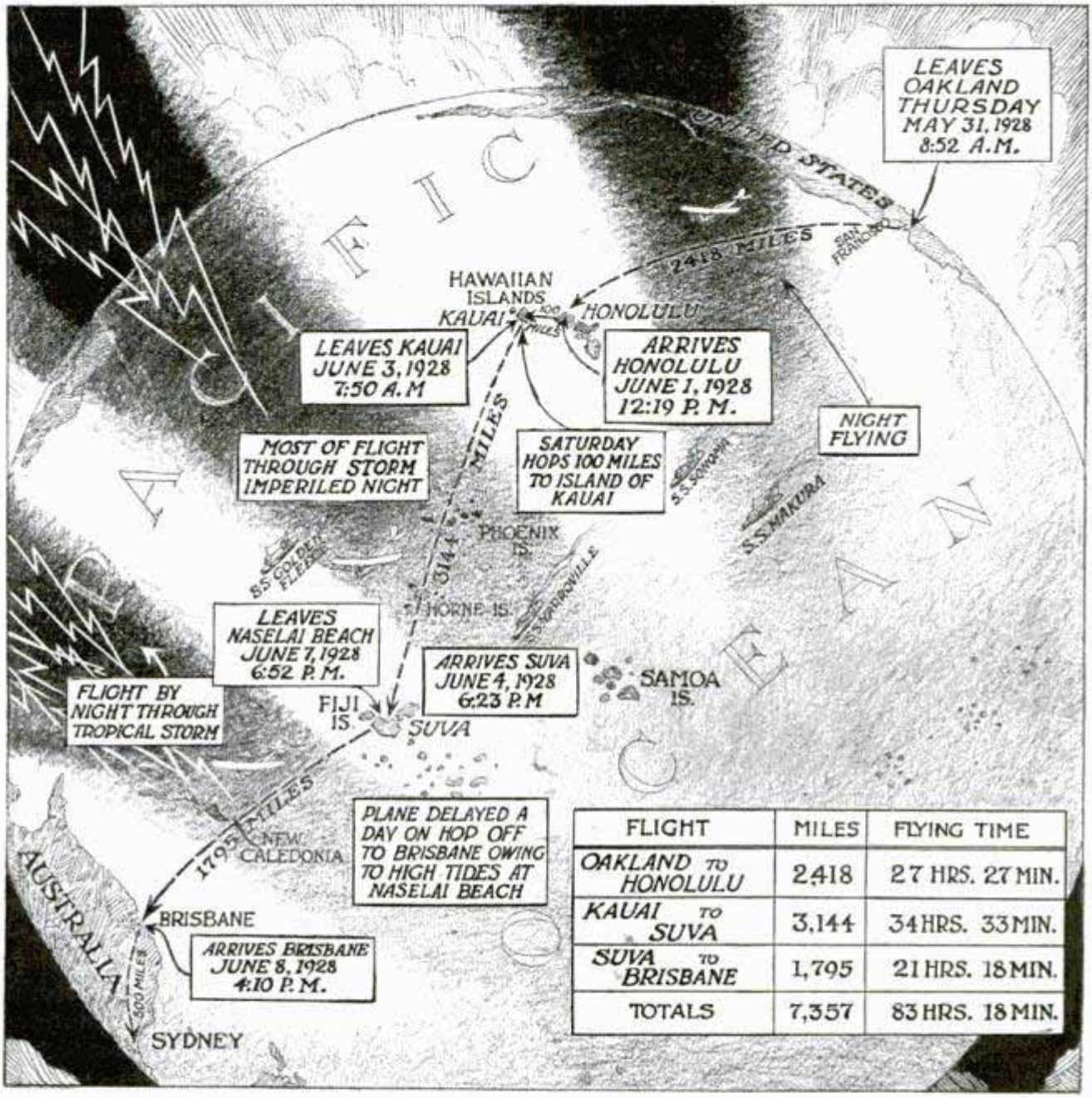
When the "Southern Cross" reached Honolulu, she had covered 2,418 miles, having been twenty-seven hours and twenty-seven minutes in the air. From Wheeler field, she made the trifling hop of 100 miles to Barking Sands, on the island of Kauai, whence on June 3, she took off—weighing in all 14,000 pounds—on the longest hop of the flight, 3,144 miles, to Suva, the port of the Fiji islands. On this Hawaii-Suva link—thirty-four hours and thirty-three minutes—radio listeners in San Francisco obtained contact with the "Southern Cross" the day she hopped and carried through with her until 9:00 a. m. of the next day.

This transmission covered more than 5,000 miles, the longest distance over which messages ever had been sent and received from an airplane in flight. But this record was shattered when Bloemfontein, South Africa, reported clear reception of Warner's messages over a distance of approximately 12,280 miles, or two and one-half times that between the plane and San Francisco. The Honolulu receiving station, Tutuila and British Samoan listeners, as well as warships and members of the merchant marine at sea, maintained contact with the "Southern Cross" clear to the moment when Warner pulled in his antenna, preparatory to landing at Suva.

More remarkable than this, on the last hop of 1,795 miles, from Suva to Brisbane, the tiny transmitter talked to the world clearly by night and less clearly by day, though it was heard around 11:00 a. m., daylight reception, in San Francisco. This was almost 7,000 miles, a distance from which a station never had been heard in the California port. At various points on its flight, the "Southern Cross" worked with ship and shore stations on the 600-meter wavelength. Messages filed in the usual way at San Francisco, addressed to the plane, were delivered promptly and answers as promptly obtained, by relay through the steamship "Wilhelmina." This also was the first time such a thing had been accomplished. In fact, the radio log of the "Southern Cross" is filled with first-time feats of both sending and receiving.

Prior to the development of this set, the writer had devoted nine years to experiments with super high-frequency radio transmission and reception. With the development of aviation came the insistent demand for a light transmitter with a long range, and the first actual experiments with such a transmitter were made on the ill-fated Dole flight to Hawaii. It will be recalled that, after some of the planes in that flight had disappeared, the "Dallas Spirit," with Captain Erwin as pilot, set out over the course, searching the sea, for the missing flyers. One of these small sets was installed, and, as a result, we were in constant contact with the "Dallas Spirit"

"Swinging Ship" to Adjust the Compasses by Compensating for Errors Due to the Mass of Metal in the Plane; the Picture Gives an Idea of the Typical Fokker Thick Wing



FLIGHT	MILES	FLYING TIME
OAKLAND TO HONOLULU	2,418	27 HRS. 27 MIN.
KAUAI TO SUVA	3,144	34 HRS. 33 MIN.
SUVA TO BRISBANE	1,795	21 HRS. 18 MIN.
TOTALS	7,357	83 HRS. 18 MIN.

On Each of the Three Legs of the Flight to Australia the Four Flyers Winged Their Way through the Night, Two of the Hops Being Made Perilous by Terrific Tropical Storms

from the time it left the Golden Gate, until it went into a tailspin, 700 miles out, and was lost. Before this accident, we received the dramatic "SOS" that the plane was falling. From this we were able to locate exactly the place and time of the deplorable disaster.

The two most important uses of the radio in connection with the epoch-making "Southern Cross" flight, of course, are, first the ability of the small set to receive bearings from ships and shore stations at considerable distances; and, second, its ability to send the position of the plane at all times, so that shore stations and ships could know at any moment exactly where the plane was. These two were especially important just after—and to a less extent, just before—the tremendous equatorial storms through and over which the "Southern Cross" passed. Following the call "Guess we are lost," from off Hilo, for example, the plane, almost immediately on receiving positions from ship and shore stations, was able to take a bee line for Honolulu, racing against rapidly emptying gas tanks.

One interesting feature was that during the terrific storm encountered about two-thirds of the way from Hawaii to Suva, land radio reception on board the plane became impossible, because of the howling

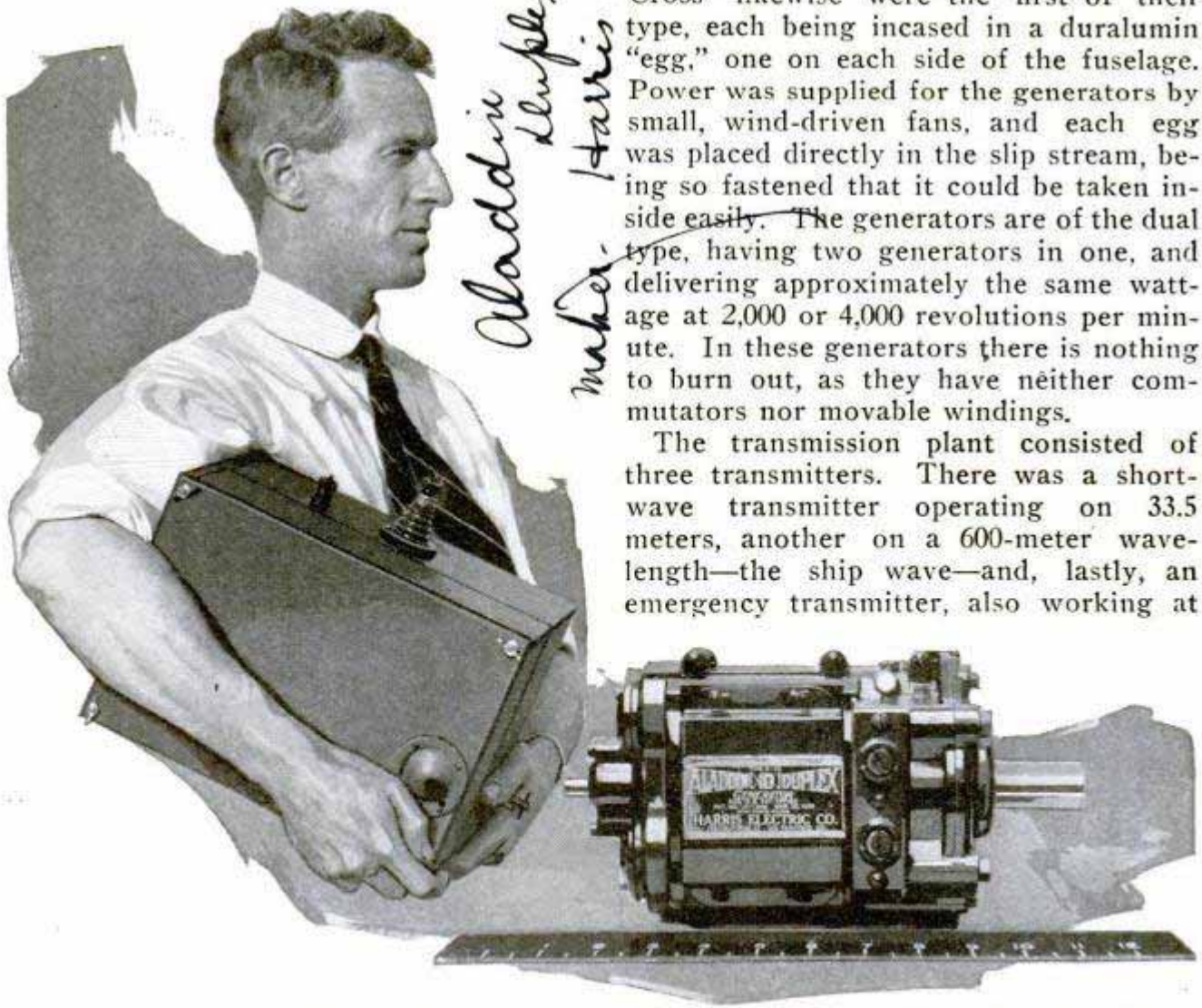
of the wind and the roar of the motors as they strove to keep the "Southern Cross" on an even keel. Yet transmission was perfect at all times, and both land and ship stations were constantly receiving messages describing the position and condition of the plane. Thus, even though Warner could not hear incoming messages, listeners on sea and land knew at all times where the plane was, and any call for help could have been answered instantly. Incidentally, the effect of the motor and gale noises was apparent when it became known that all four men were totally deaf for some time after making their landing at Brisbane.

The transmitter with which the "Southern Cross" was protected is of the short-wave type, with fifty watts' output, employing the tuned-plate, tuned-grid circuit, and weighing, complete, eight and one-half pounds. It uses a UV-211 tube, the short-wave antenna being twenty-six feet long and having a special "fish" which cannot drop off, because of a peculiar spring device which takes up the stresses. One of the most important problems of airplane radio installation is that of the fish dropping off when going at high speed, or pulling the antenna completely off the reel. The novel fish used on the "Southern Cross" cannot do either of these things.

The reel for the antenna also is of a special design, being so constructed that, even when freed from hand control, it automatically locks itself, and prevents the running out of more than one-half inch of the antenna at a time. The long-wave antenna is 400 feet long. Both antennas are thin phosphor-bronze wires, which trail through a bakelite tube, thoroughly insulated, on the fuselage. The long-wave antenna also was used for the purpose of receiving.

The generators on the "Southern Cross" likewise were the first of their type, each being incased in a duralumin "egg," one on each side of the fuselage. Power was supplied for the generators by small, wind-driven fans, and each egg was placed directly in the slip stream, being so fastened that it could be taken inside easily. The generators are of the dual type, having two generators in one, and delivering approximately the same wattage at 2,000 or 4,000 revolutions per minute. In these generators there is nothing to burn out, as they have neither commutators nor movable windings.

The transmission plant consisted of three transmitters. There was a short-wave transmitter operating on 33.5 meters, another on a 600-meter wavelength—the ship wave—and, lastly, an emergency transmitter, also working at

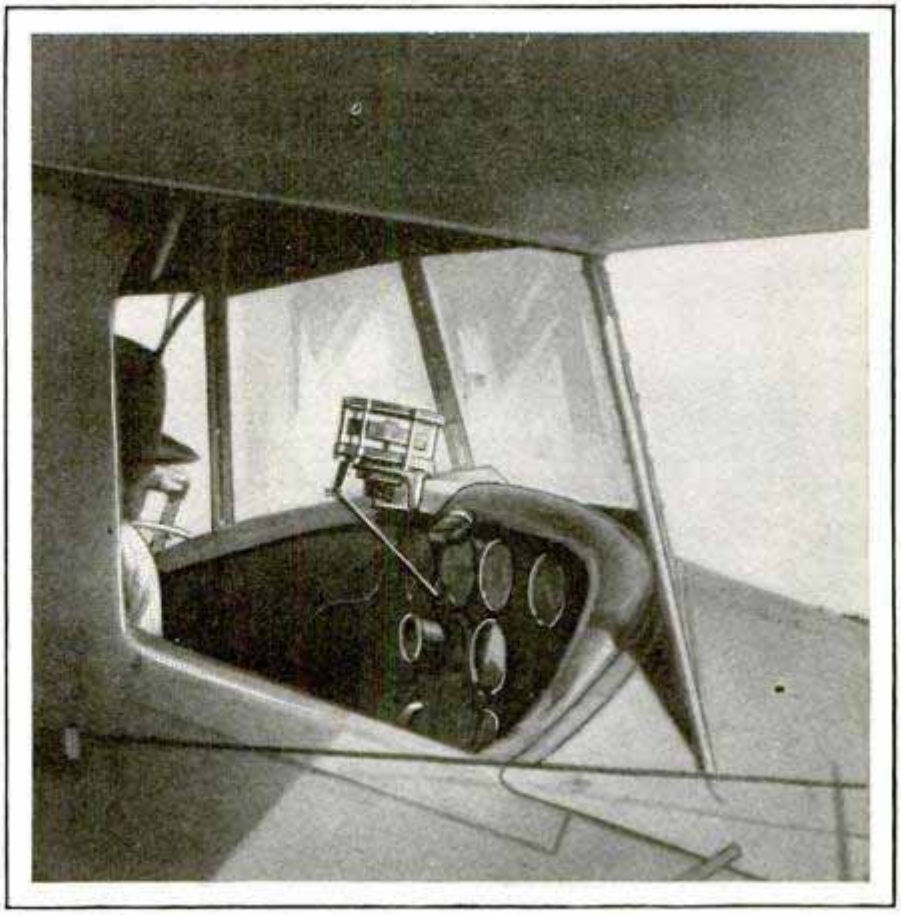


Captain Kingsford-Smith with the Waterproof Radio Set and One of the "Two-in-One" Generators Which Furnished the Power to Operate the Wireless throughout the Flight

600 meters, but completely waterproof, so that it could operate under water for eight hours. This would have enabled Warner to send messages just as long as the plane stayed afloat, either in air or on water.

The receiving set also consisted of three units, equipped with the common audio amplifier. One of these was a short-wave receiver; another a long-wave receiver, and the third, the beacon receiver.

On the hop from Oakland to Honolulu, direct messages from the plane were received in San Francisco until very shortly before the plane landed on Wheeler field. At the same time, Honolulu was getting messages, starting one and one-half hours after the "Southern Cross" left the California port. This was all done on the short wave.



The Pilot's Cockpit of the "Southern Cross" Is Just under the Front Edge of the Wing, with a Clear, but Protected View

Warner also worked four ships on the 600-meter wave, and communicated at will with shore stations on the same wavelength. On the Honolulu-Suva hop, the plane was followed by Honolulu, and after two hours out of that port, was picked up by Tutuila. At night, commencing at 8:00 p. m., and lasting until 6:00 a. m., messages were received direct from the plane at San Francisco, on the short wave. From Suva to Brisbane, the plane was in communication with San Francisco once, for about fifteen minutes, and the remainder of the time, messages were relayed through ships and through the Tutuila land station.

In other words, with a combined transmitter, receiving set and generators weighing only ninety-six pounds, the "Southern Cross" was in constant communication with shore stations or ships throughout the 7,357-mile flight. For the first time in history, messages regularly filed through commercial stations were delivered to the plane, and replied to by the plane. In brief, radio went farther and accomplished more with an entirely new type of equipment, on the "Southern Cross" flight, than it ever had done on any flight before.

MASTER SCALE FOR RAILROADS TO AID SHIPPING

Weighing freight is one of the most important features of railroad operation, as some $4,000,000,000 are involved in charges annually on the United States lines alone. To insure accuracy in this process, a master scale has been installed in Chicago by the bureau of standards where it will be available to thirty-five railroads operating in the territory. It has a capacity of 150,000 pounds, but is so sensitive, that it will register differences as small as one-tenth of a pound. Expert engineers were required to install it and one of the most interesting features of its construction was the manner of building the pit to make it strong and waterproof. The floor is four feet thick and the side walls average two feet in thickness. Special coatings were applied to keep out water.

Coast-Defense Gun Mounted on a Railway Car; the Two Cylinders above the Barrel Absorb the Recoil

BIG GUNS ON RAILS AID DEFEAT OF "FLEET" IN WAR GAME

Two battalions of railway artillery and a battery of sixteen-inch howitzers hurled projectiles at four targets that moved slowly in a line off Cape Henry, Va., recently. The gunners were playing a war game. The targets represented an enemy fleet and the big guns were defense units such as might be quickly mustered in the event of a real engagement. At the end of the "battle," judges declared that the artillery had won.

A CORRECTION

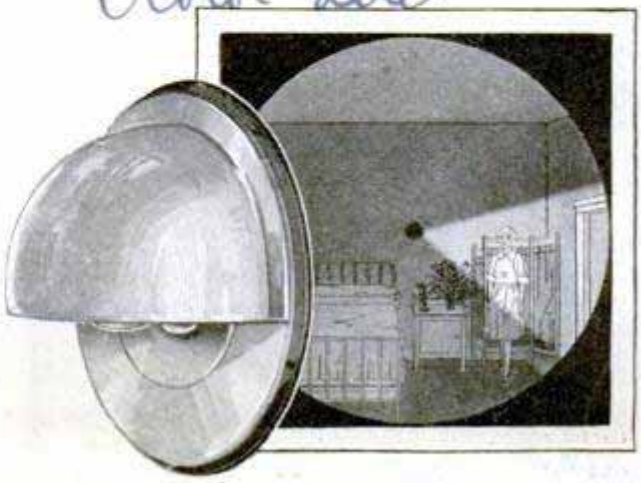
In the description of a cure for seasickness on page 63 of the July issue, the chemical, sodium nitrate, was named in error. The material used in the cure is sodium nitrite.

LAMPBLACK MELTS ICE TO FREE STEAMER

How a lesson learned from his school physics helped a steamer captain free his craft from an ice-locked lake in Alaska, has just been told. Remembering that black absorbs the sun's rays and holds the heat, the captain ordered a long strip of refuse oil and lampblack, forty feet wide, to be swabbed across a frozen lake where his boat was held. In a short time, the strip had melted or softened so that the steamer could break through the channel.

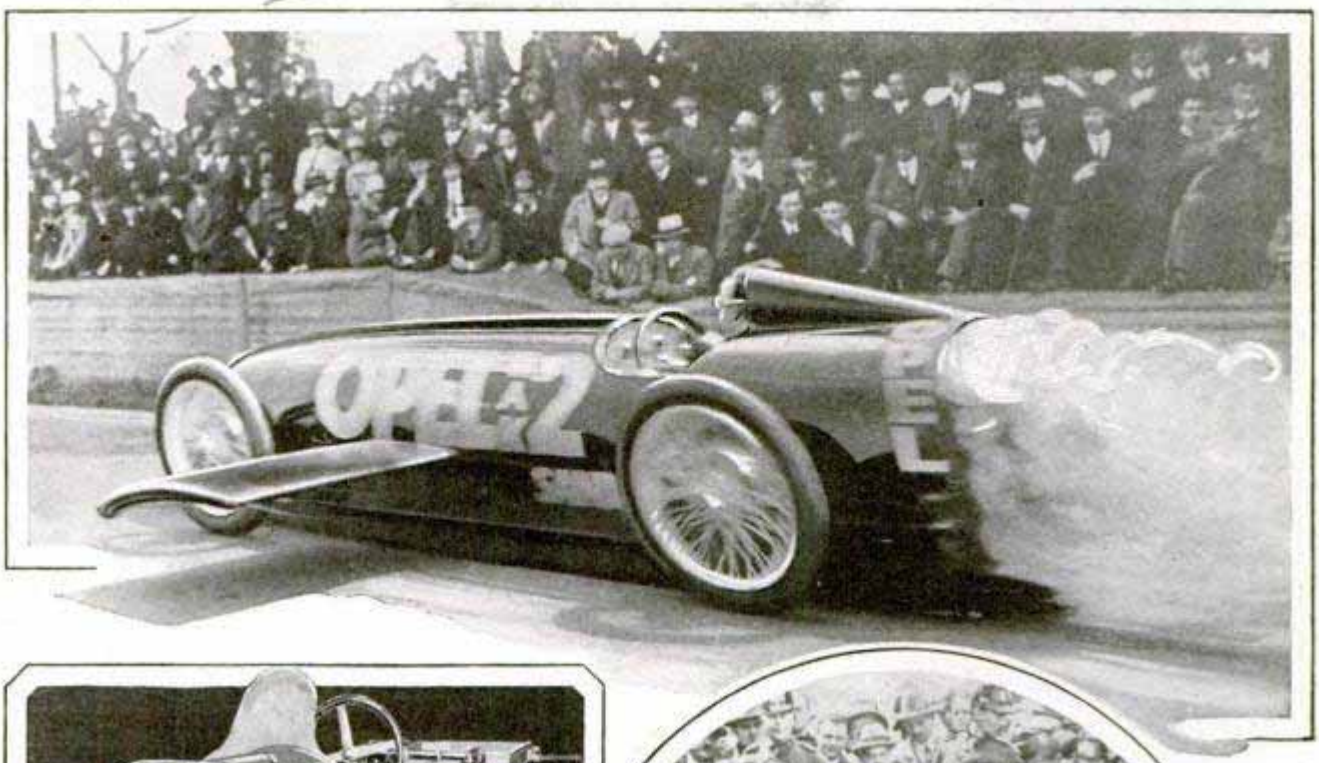
ROTATING SHADE HELPS FOCUS LAMP

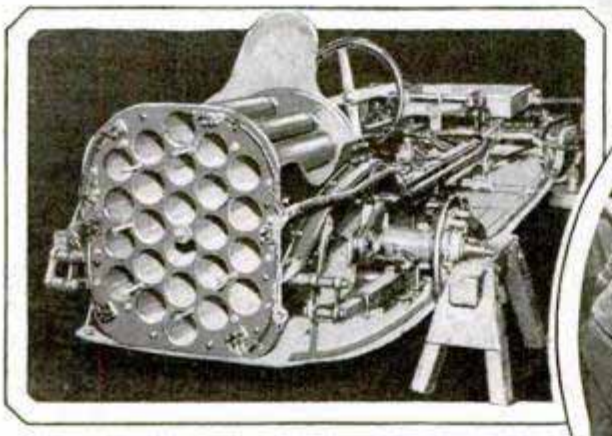
Designed especially for use in hospitals, but adaptable to other purposes, a wall lamp has a rotating shade with an open section through which the rays shine out in a directed beam. To focus the light in any direction, it is only necessary to turn the shade. Somewhat the same effect as is produced by a spotlight is thus obtained, and the rest of the room is shielded from the glare.

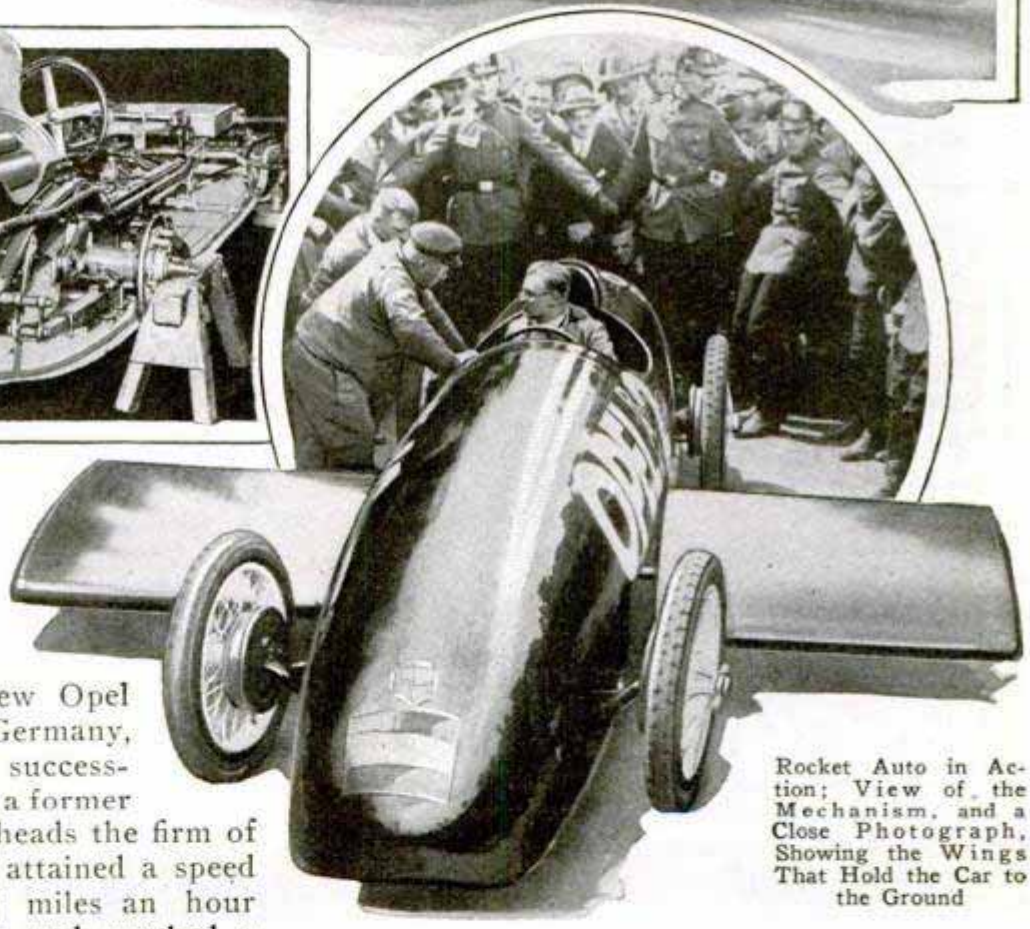


Close View of the Rotating Shade Lamp, and Drawing to Show How Rays Are Focused

ROCKET CAR IS HELD DOWN TO GROUND BY WINGS

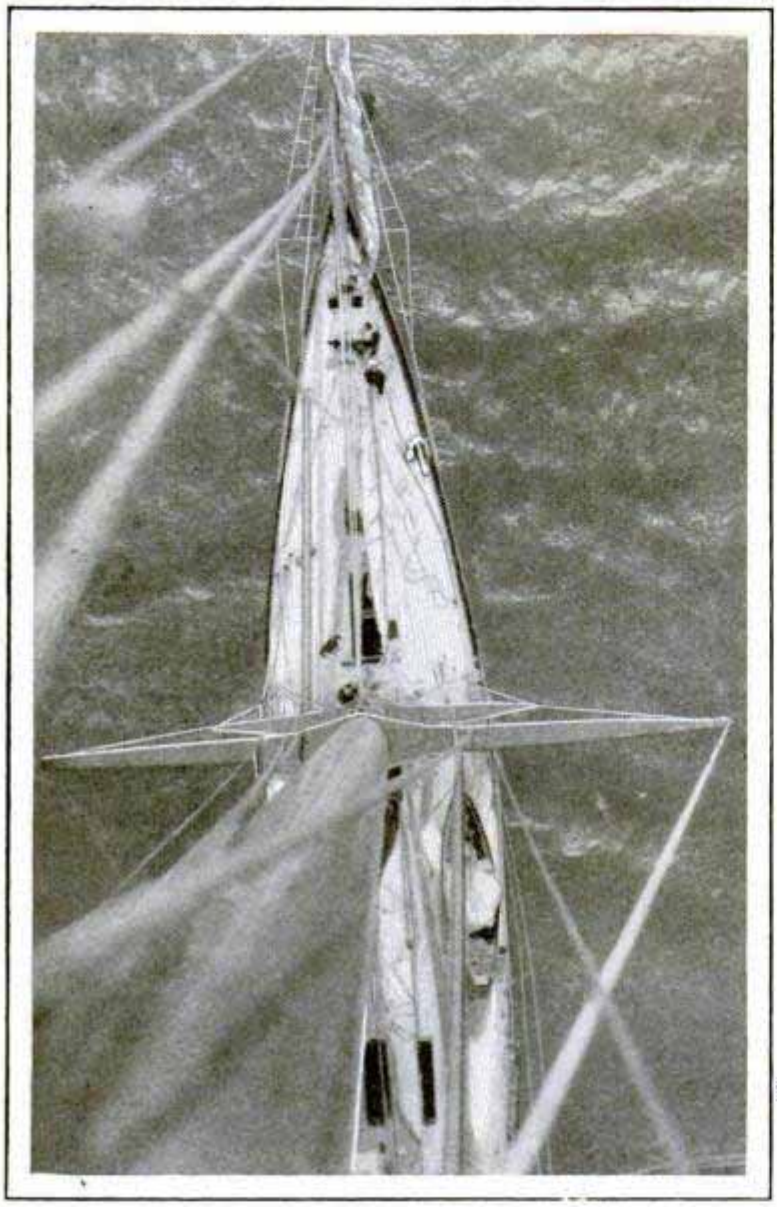






Rocket Auto in Action; View of the Mechanism, and a Close Photograph, Showing the Wings That Hold the Car to the Ground

Using short airplane wings, with their lines reversed so that instead of lifting they exert a downward force, the new Opel rocket car, built in Germany, recently was tested successfully by Fritz Opel, a former racing driver who heads the firm of builders. The car attained a speed of better than 106 miles an hour within six seconds, and reached a top speed of more than 130 miles an hour. Twenty-four rockets, housed in compartments in the rear, constituted the propelling force. At the start, the driver closed a switch that fired two rockets simultaneously by electricity. As they burned down, connections ignited the others in turn. When the first pair of rockets lit, there was a tremendous roar, and clouds of smoke, mixed with long tongues of flame, leaped from the rear of the car. The flame and smoke was so dense that spectators across the track were blotted out as the car tore past. The inventor, Max Valier, a German engineer, has built a rocket airplane which is reported to have proved a success in a secret trial in the Roen mountains.



How the "Talayha" Looks from the Top of the Masts; Photograph of the Slender Hull from Upper Rigging

HOW BIG YACHT SPLITS WAVES SEEN FROM TALL MAST

Construction that reduces the resistance of the water to a minimum is an essential factor in racing yachts, and this feature is well illustrated in the "Talayha," one of the boats entered in the race from Los Angeles to Honolulu. A camera view from near the top of the craft's 120-foot mast, showed the slim, graceful lines of the beautiful racer.

MECHANICAL MAN IS NOW GIVEN THE GIFT OF SPEECH

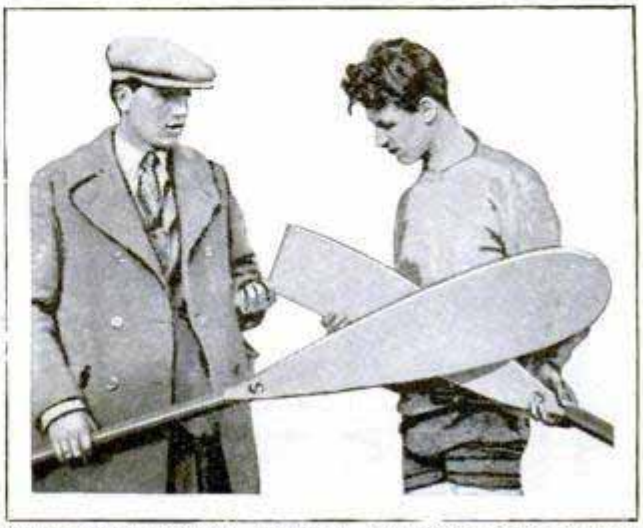
857

The "mechanical man" invented by R. J. Wensley, of the Westinghouse Electric and Manufacturing company, has had the gift of speech added to his accomplishments. The original machine, which was first used commercially to report on the depth of water in the reservoirs of Washington, D. C., could answer only in code, through buzzer signals. Now, when it responds to a telephone call, it lifts the receiver and in a well modulated and deferential voice says: "Televox speaking." The device can even imitate a conversation, for it is so arranged that, if something goes wrong with machinery or equipment entrusted to its care, it can lift the telephone receiver and, when the operator answers, say "This is Televox calling for" and give the proper telephone number. After the connection is established, the conversation is carried on in buzzer code. By sending the proper signals, the person in charge can get code replies that will fix the trouble. The talking mechanism consists of predetermined conversations, photographed on a film.

SPOONLIKE RACING OAR TO INCREASE SPEED

628

As a substitute for the usual square-tipped oar, crews of the University of Washington are using an elliptical one, shaped like a spoon. Its designer asserts that it will enter the water more cleanly and quickly than the old type, enabling the oarsman to use faster strokes with greater smoothness, thus gaining increased speed.



Designed for Faster Rowing; the Spoon-Shaped Oars Introduced at the University of Washington

by George Porock

Where Women Do Most of the Work; a Farming Crew in Sumatra Loosening the Soil for Seeding by Digging with Long, Sharp Poles

WOMEN FARM EXPERTS SPEED AGRICULTURE IN SUMATRA

Women do most all of the work in the fields and in the homes among the Bataks of Sumatra. Some of their farming customs and implements are unique. To loosen the soil for planting crops, long poles, sharpened at one end, are forced into the ground and then pried out. This crude method has been in use for generations and is always performed by women.

TWO-FILAMENT MINERS' LAMP PREVENTS LOSS OF TIME

Adequate light for the miner throughout the day is assured in a special electric lamp, developed by the General Electric company. It has two filaments that operate at different intensities. The main one gives a fourteen-candlepower light and is used until it fails. Then a simple switch, attached to the side of the lamp, is turned, throwing the current into a low-candlepower emergency filament that will burn for thirty hours or more. This makes it unnecessary for the miner to stop work and change his lamp in case of failure. The light is fitted into a small reflector on the miner's cap and is operated from a compact, two-cell storage battery strapped to a belt about the man's waist.

EXTENSION RIM ON AUTO WHEEL HELPS TRAVEL IN MUD

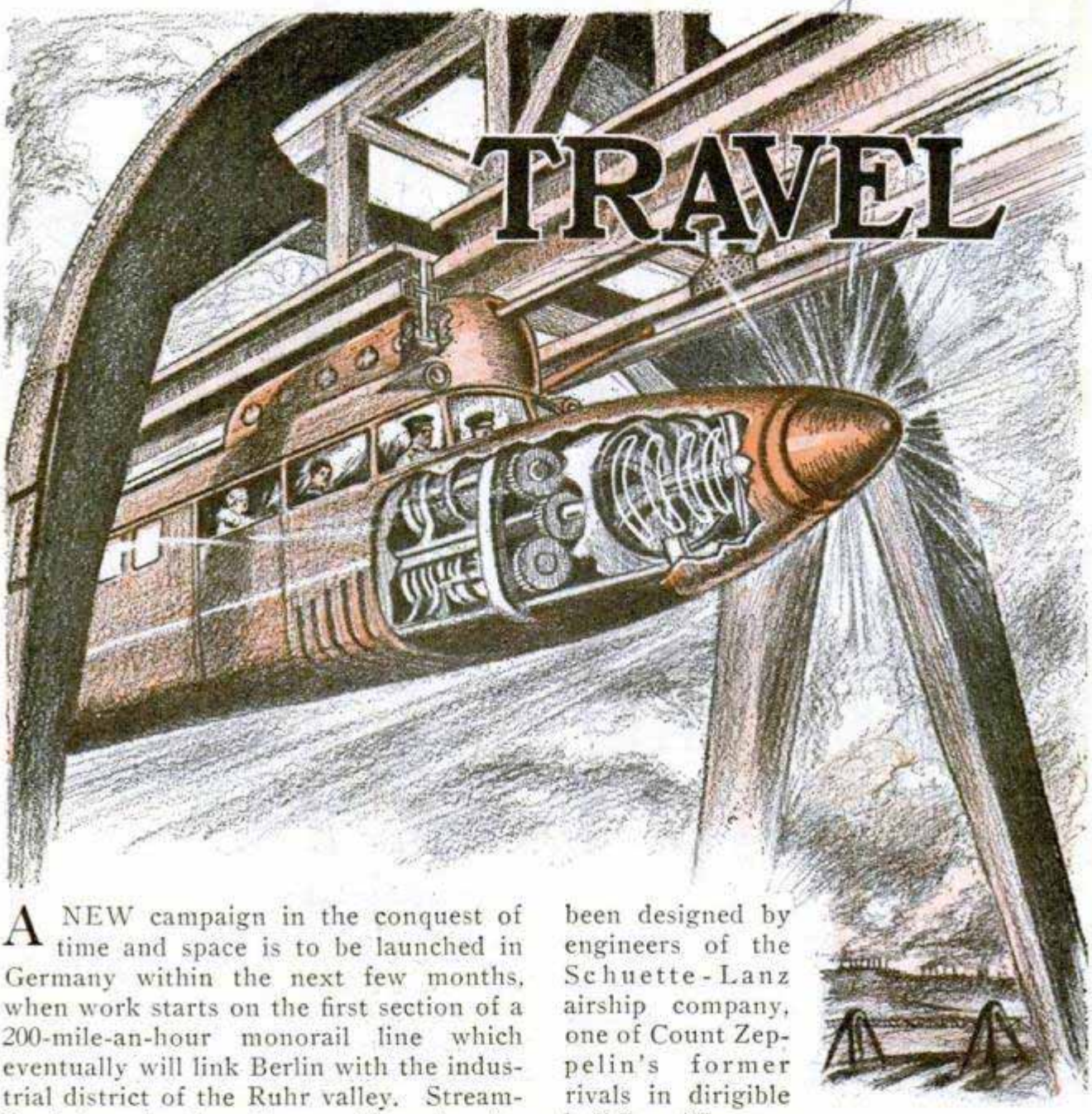
Auto travel over muddy roads or soft ground is said to be simplified with the help of a demountable extension rim that can be quickly attached to the wheels. It is fastened with specially designed nuts and has a clamp that holds it to the hub. No tools are necessary to connect it and it does not interfere with travel on pavements.

600.

537 S. Dearborn
Chicago

Worked out by French engineers, Hirschauer and Talon

TRAVEL

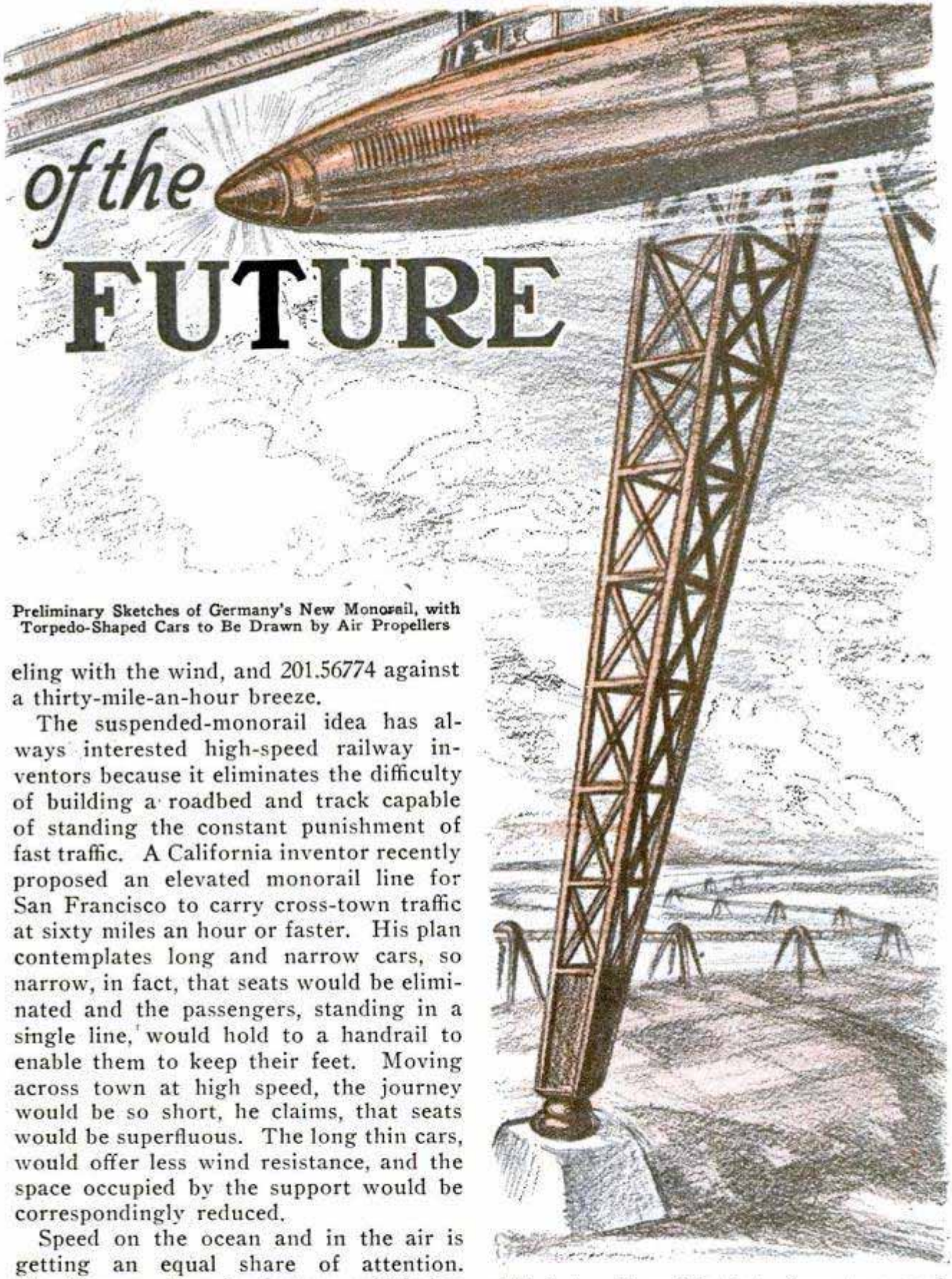


A NEW campaign in the conquest of time and space is to be launched in Germany within the next few months, when work starts on the first section of a 200-mile-an-hour monorail line which eventually will link Berlin with the industrial district of the Ruhr valley. Streamlined torpedo-shaped cars, driven by airship propellers at either end, are to be hung on ball-bearing rollers from an overhead track.

Monorail lines are not new in Germany, for several are already in operation. The novelty of the new project is the great speed expected from the use of air propellers instead of the usual geared driving wheels.

Electric motors are to turn the propellers, getting their energy from a trolley rail, so that no fuel will be carried. Two experimental sections have been planned, one from Berlin to Halle and the other from Cologne to Dusseldorf, and work on one or the other is planned to start before the end of the year. The aerial cars have been designed by engineers of the Schuette-Lanz airship company, one of Count Zeppelin's former rivals in dirigible building. The projected speed—200 miles an hour—is practically double that of passenger-carrying airplanes, nearly three times the most efficient cruising speed of Zeppelin airships, and almost four times as fast as the railway schedule for the same distance. In fact, not many racing planes, and only a very few special racing automobiles have ever attained it. When Ray Keech, driving the White triplex car, powered with three Liberty engines, recently set a new world's record of 207.5526 miles an hour on the Daytona sands, only two other drivers had officially passed the 200-mile mark—Capt. Malcolm Campbell and Maj. Segrave. Keech made 213.90374 miles an hour over the measured-mile course, trav-

of the FUTURE

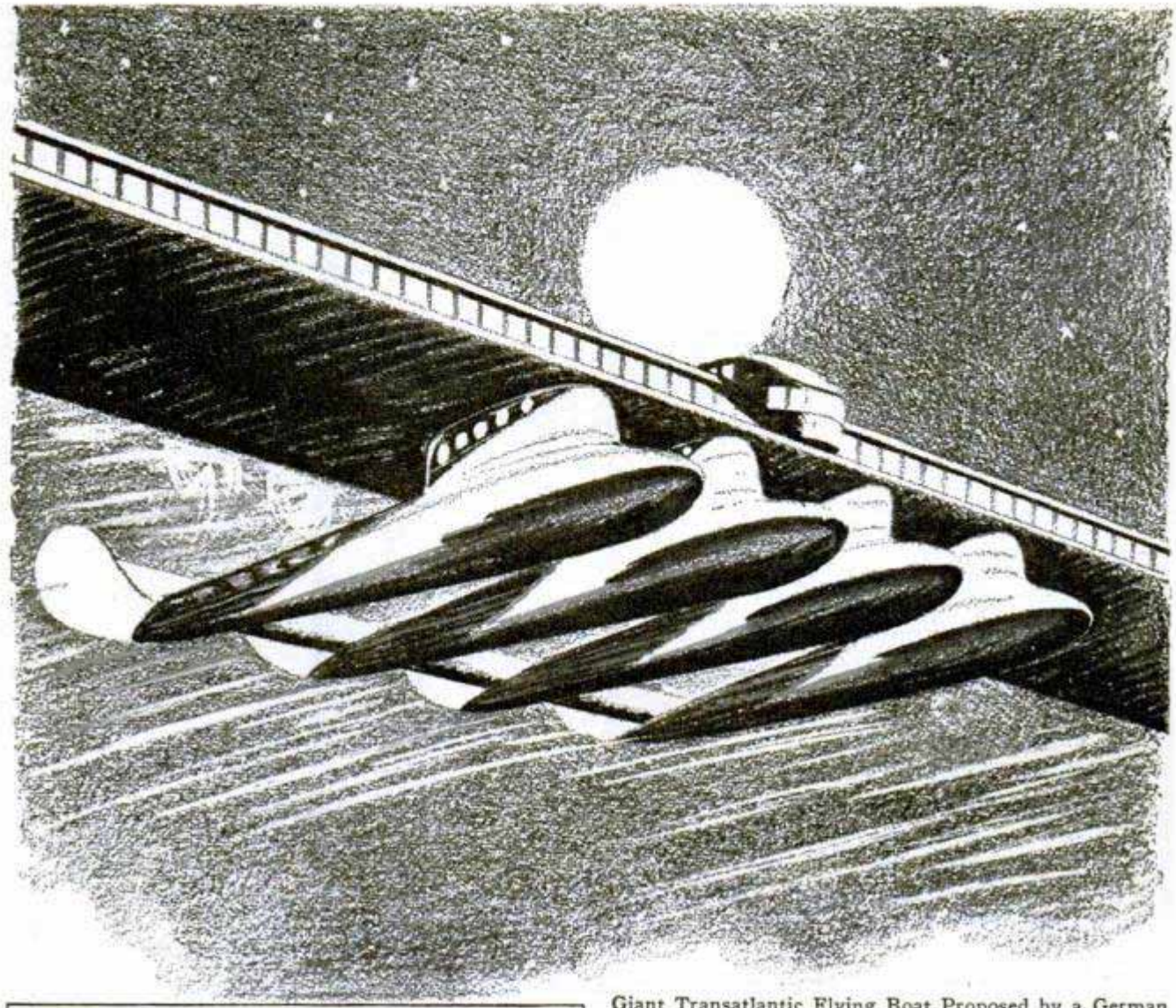


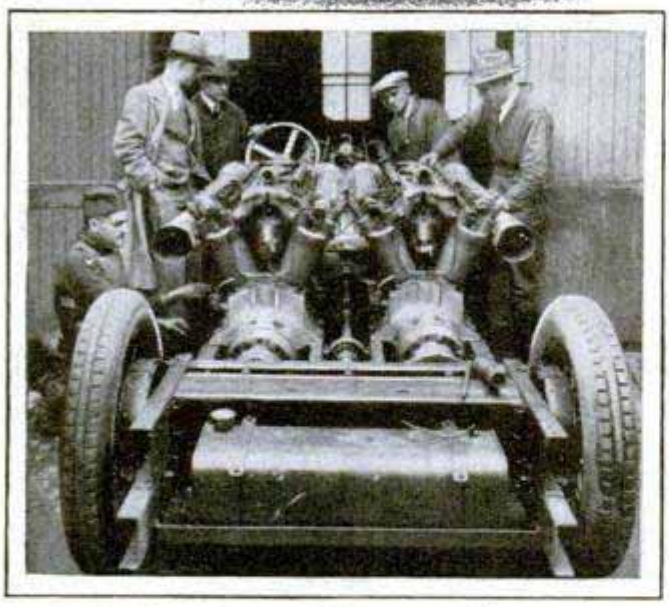
Preliminary Sketches of Germany's New Monorail, with Torpedo-Shaped Cars to Be Drawn by Air Propellers

eling with the wind, and 201.56774 against a thirty-mile-an-hour breeze.

The suspended-monorail idea has always interested high-speed railway inventors because it eliminates the difficulty of building a roadbed and track capable of standing the constant punishment of fast traffic. A California inventor recently proposed an elevated monorail line for San Francisco to carry cross-town traffic at sixty miles an hour or faster. His plan contemplates long and narrow cars, so narrow, in fact, that seats would be eliminated and the passengers, standing in a single line, would hold to a handrail to enable them to keep their feet. Moving across town at high speed, the journey would be so short, he claims, that seats would be superfluous. The long thin cars, would offer less wind resistance, and the space occupied by the support would be correspondingly reduced.

Speed on the ocean and in the air is getting an equal share of attention. The German Dornier factory, which has been building double-engined flying boats with success for several years, is constructing a transatlantic air liner in its Swiss factory. The ship, a twelve-engined monoplane, will have a wing spread of 158 feet, will weigh forty-four tons, and carry fifty passengers, besides the crew. Following the usual Dornier design, the engines will be mounted in tandem pairs, one driving a tractor propeller in front of the wing, and its mate driving a pusher



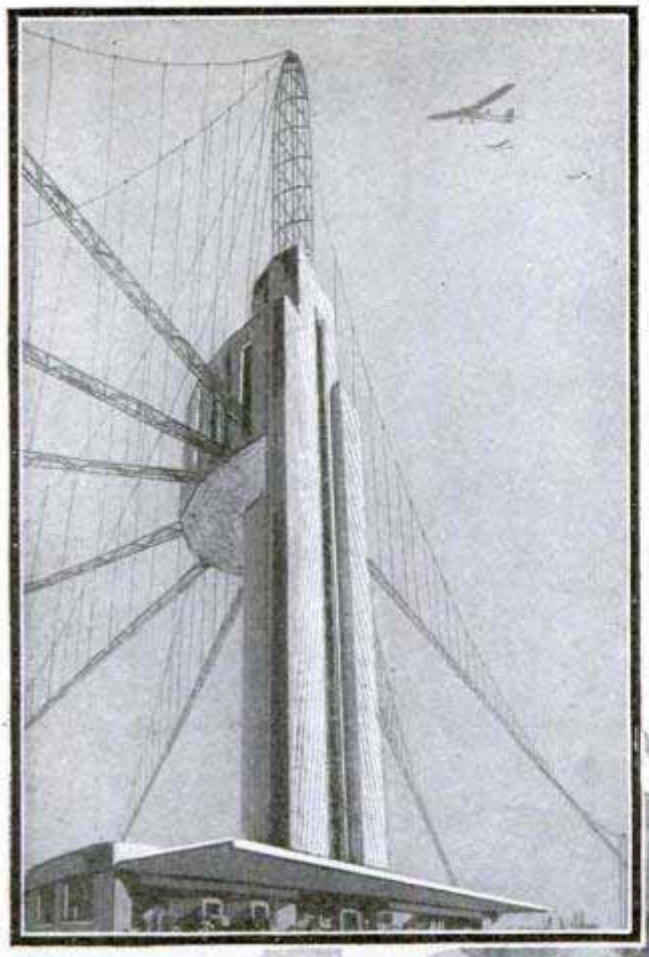


Giant Transatlantic Flying Boat Proposed by a German Inventor, and, Left, the Three-Thousand-Horsepower Triple-Engined Car That Set a World's Speed Record at Daytona Beach

behind the wing. The propellers are to be of the relatively slow, and highly efficient, four-bladed type.

The fuselage, which will contain the passenger compartments, is modeled along the lines of a boat, even to the flaring cruiser bow, and, when at rest on the sea, will be equipped with demountable boat railings. The twelve 500-horsepower engines will make it the most powerful airplane ever built. Nine men will be carried in the crew—two pilots, a navigator, two wireless operators, two mechanics and two stewards.

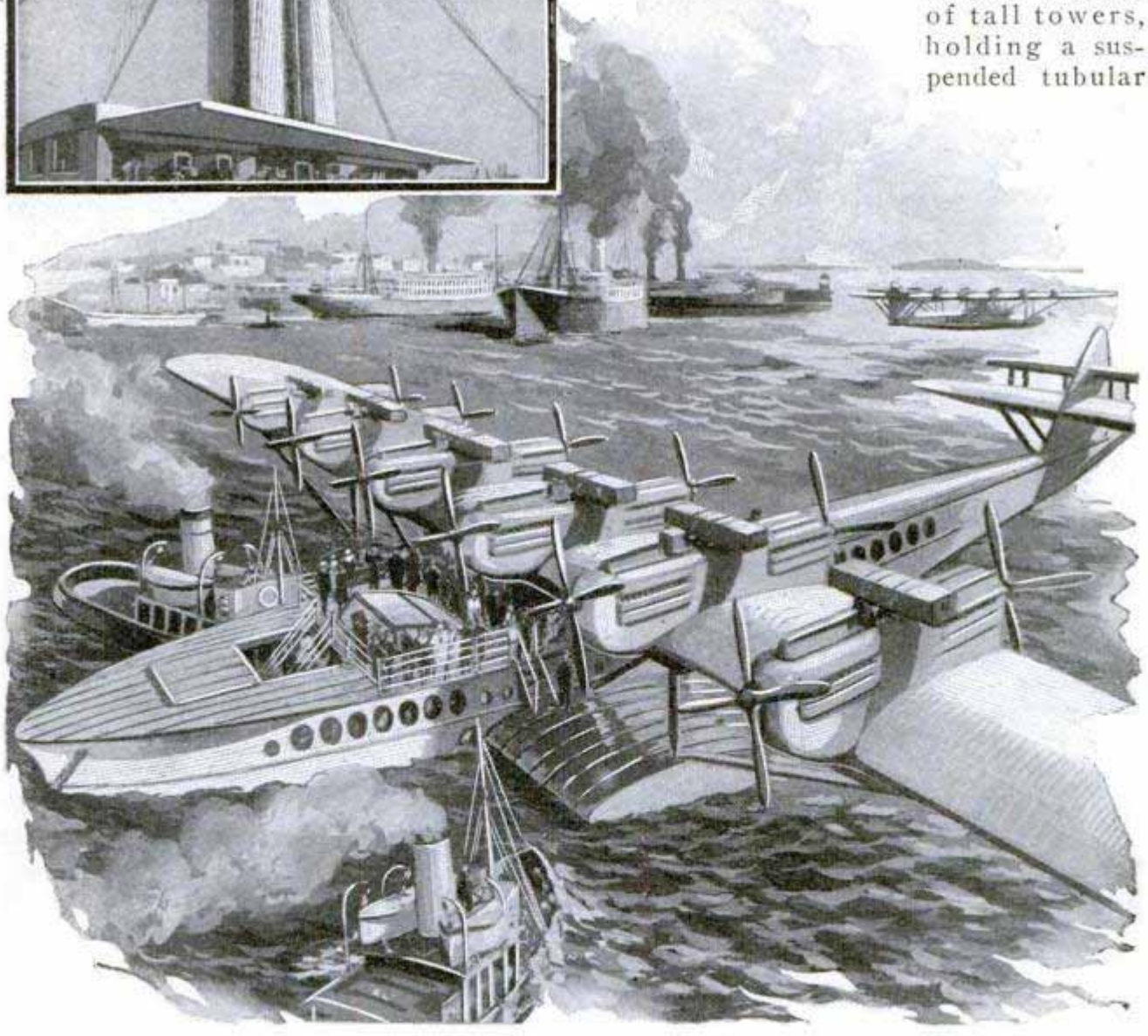
Another German company is experimenting with a high-speed surface liner, which, instead of being pushed through the water by a propeller, will be pulled along by suction blades, drawing water into the hull and expelling it through openings farther aft. The experimental model provides four suction turbines, two on either side just aft of the bow, and two well back toward the stern. The hull itself would be of the "teardrop" type—the most efficient streamlined shape—fairly blunt forward and "fined down" to a point at the stern, and all the super-



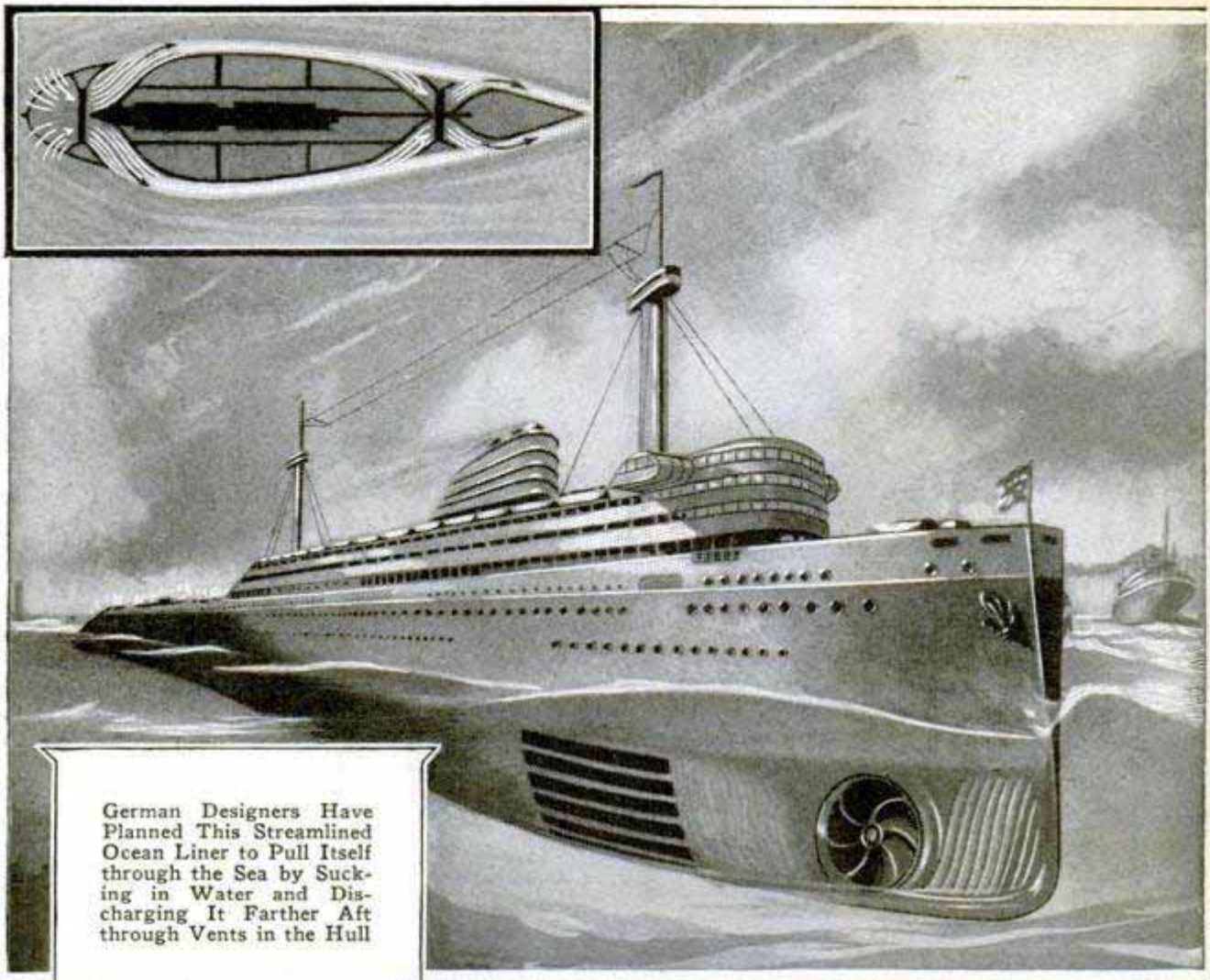
structure would be streamlined to the same shape.

Another transatlantic project proposed in France is a combination of surface boat with short airplane wings and air propellers. A small craft of this type recently crossed the English channel in forty minutes. It combines the lifting effect of the airplane wings with a glider hull, so that, at full speed, it rides the surface of the sea instead of plowing through the water, thereby reducing friction. The wings are not large enough to actually lift the craft off the water.

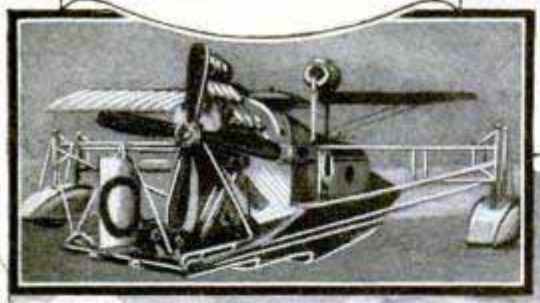
Two French engineers, Hirschauer and Talon, have invented a high-speed aerial cableway for transportation of mails, and are trying to interest the French government in it. They propose a series of tall towers, holding a suspended tubular



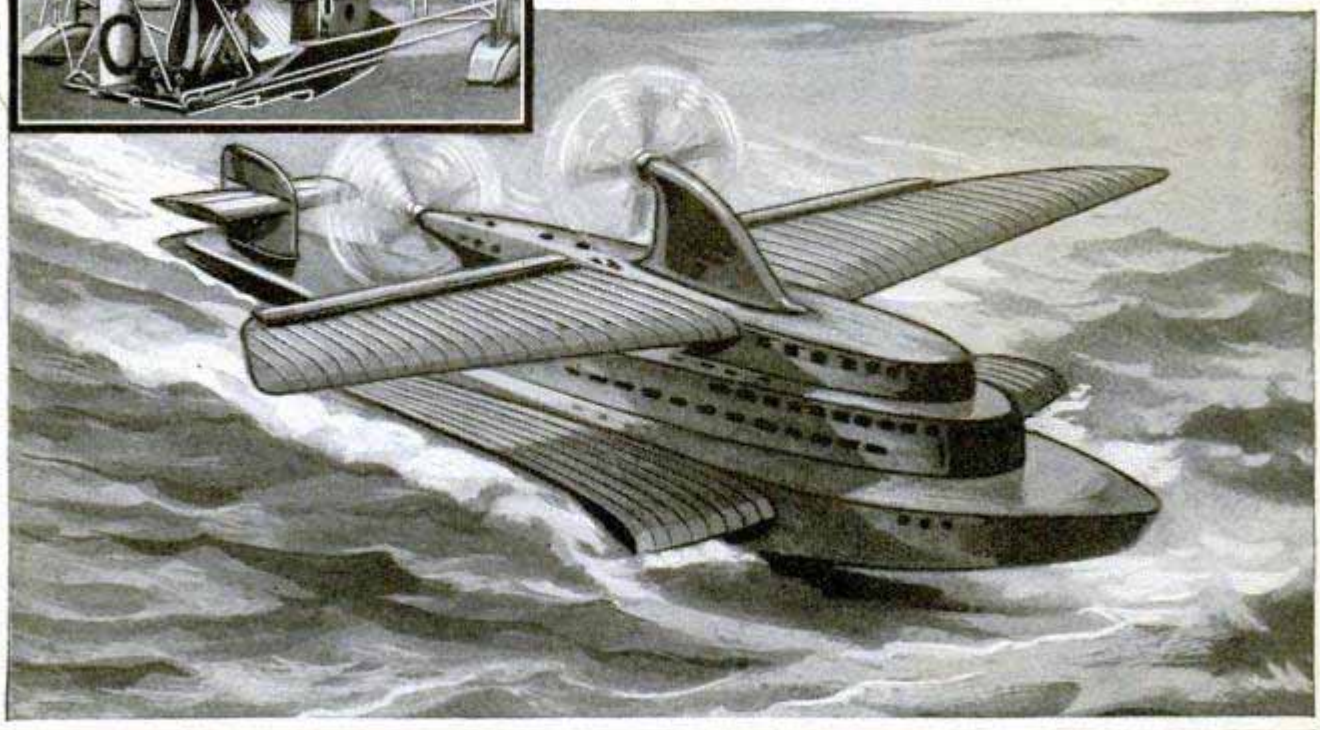
Twelve-Engined Flying Boat Being Built in Switzerland by the Famous Dornier Factory, and, Above, a Frenchman's Idea for a Three-Hundred-Mile-an-Hour Aerial Postal Service

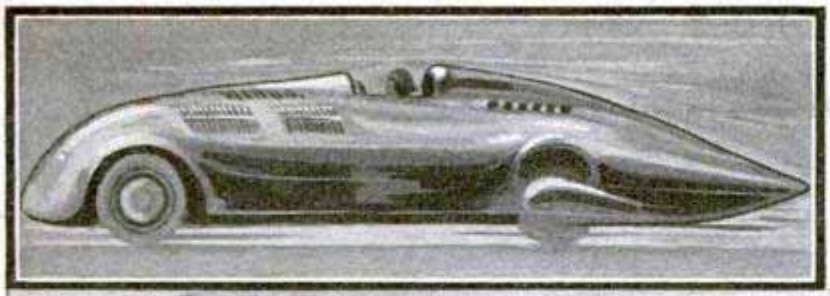


German Designers Have Planned This Streamlined Ocean Liner to Pull Itself through the Sea by Sucking in Water and Discharging It Farther Aft through Vents in the Hull

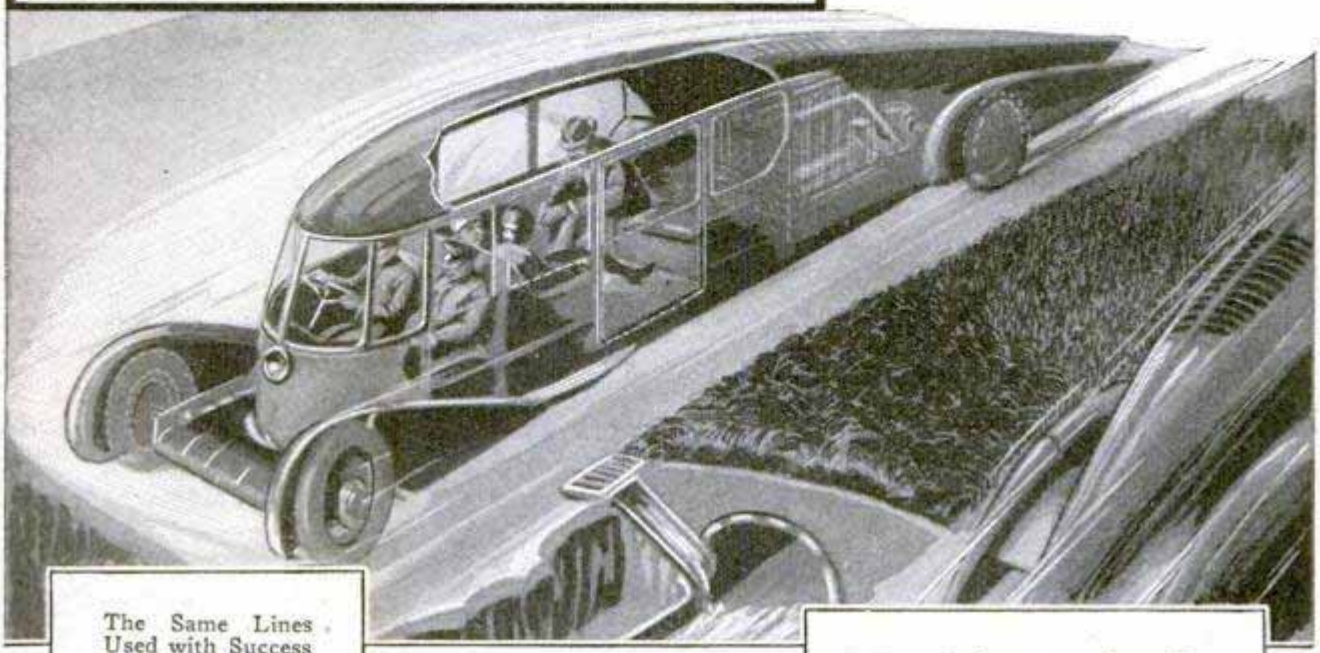


Left, This Queer Craft Is Not an Airplane, But a Hydroplane, Which Has Cut the Voyage from France to England to a Matter of a Few Moments; Below, a Proposed German Air Liner to Carry 200 Passengers across the Atlantic in Half the Time of the Fastest Steamers



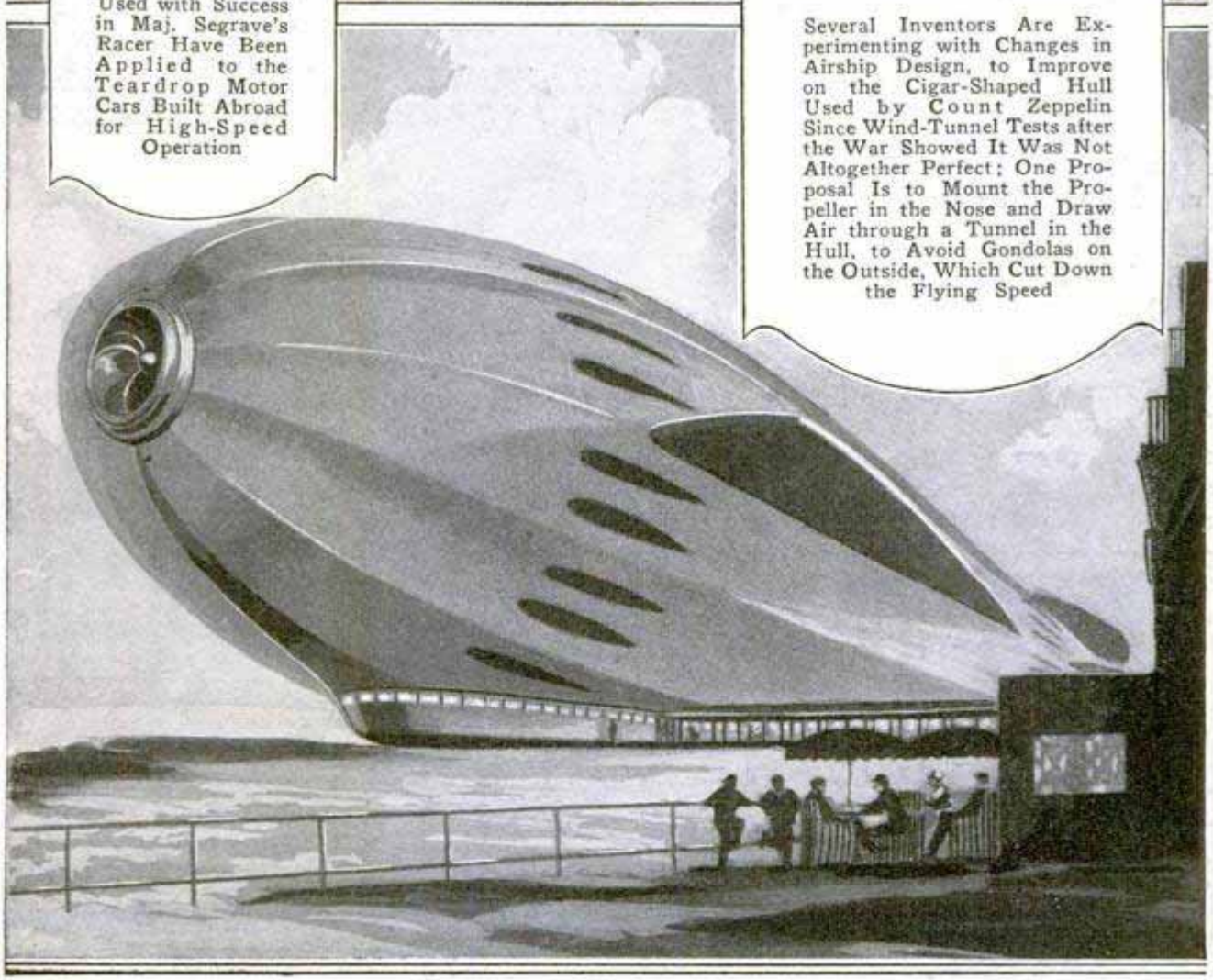


cage, in which torpedo-shaped mail containers, eight or ten feet long, would be driven by electric motors at 200 miles an hour. The construction, it is claimed, is cheaper than underground pneumatic tubes.



The Same Lines Used with Success in Maj. Segrave's Racer Have Been Applied to the Teardrop Motor Cars Built Abroad for High-Speed Operation

Several Inventors Are Experimenting with Changes in Airship Design, to Improve on the Cigar-Shaped Hull Used by Count Zeppelin Since Wind-Tunnel Tests after the War Showed It Was Not Altogether Perfect; One Proposal Is to Mount the Propeller in the Nose and Draw Air through a Tunnel in the Hull, to Avoid Gondolas on the Outside, Which Cut Down the Flying Speed



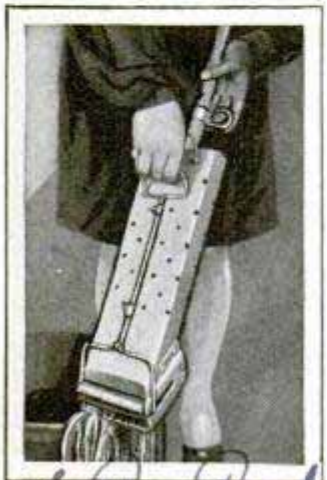
APPLY FERTILIZER WITH HOSE WHILE WATERING LAWN

As Water Pours through the Nozzle, It Carries with It Fertilizing Material from Chamber

Distributed from a container attached to the garden hose, a special conditioning material has been prepared for improving the lawn soil, preventing packing and baking and loosening hard ground. Fertilizing substance is applied in the same way, insuring even treatment and saving time.

SELF-WRINGING MOP SOLVES CARRYING PROBLEM

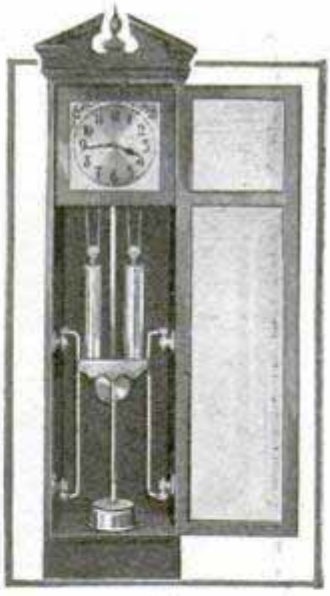
The problem of carrying an unsightly mop among hotel and restaurant guests to wipe up spilled liquids is solved by a new self-wringing type, for which a patent application has been filed. The mop disappears into a metal container when not in use, and is ejected as needed by a lever on the handle. While it was designed primarily for use in public places, it also is suitable for homes, and the container handle enables it to be stored away without damage to neighboring articles or to the mop itself. The metal container carries a fixed and a movable roller, the latter controlled by a slide rod and handle, so they can be drawn together and held with one hand while the other operates the lever drawing the mop between them for wringing.



NAILS STILL MADE BY HAND IN PARTS OF ENGLAND

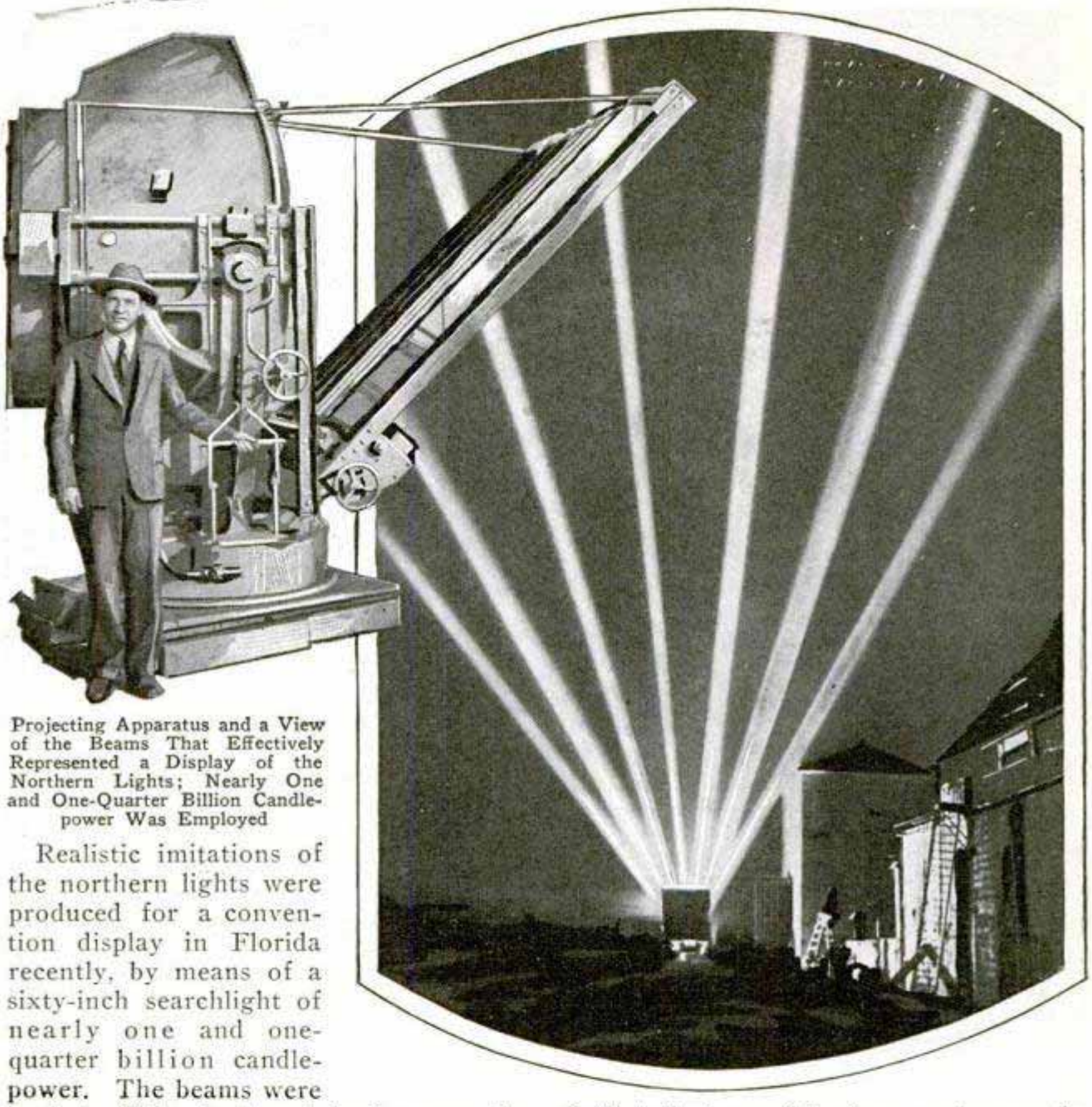
Making nails by hand is still practiced in parts of England, where a few skilled survivors of the days when practically all the nails were manufactured in this manner, fill orders for units of a special pattern. A woman and her young niece are among the best-known workers in this field. It is estimated that there are less than fifty persons living in this part of the world who are adept at the art, while but a few years ago the craft was practiced in nearly every home of every village. A few persons still retain the little "smithy" where their fathers and mothers used to work at forge and anvil.

THERMAL MOTOR WINDS CLOCK AS TEMPERATURE CHANGES



Since 1914, a clock in Dayton, Ohio, has been running without being wound by human hands. It is equipped with a thermal motor, consisting of a gallon tank filled with alcohol, a one-half-inch cylinder and piston with a ten-inch stroke. A rise in the temperature expands the alcohol, pushing the piston up with a series of weights weighing sixty pounds. A fall in temperature allows the weights to descend, winding the springs in the clock movement. There is no escape for the alcohol or the lubricating oil, so that the clock should run indefinitely as long as there is a change of five degrees or so in the temperature every twenty-four hours.

NORTHERN LIGHTS TO ORDER WITH SEARCHLIGHT



Projecting Apparatus and a View of the Beams That Effectively Represented a Display of the Northern Lights; Nearly One and One-Quarter Billion Candlepower Was Employed

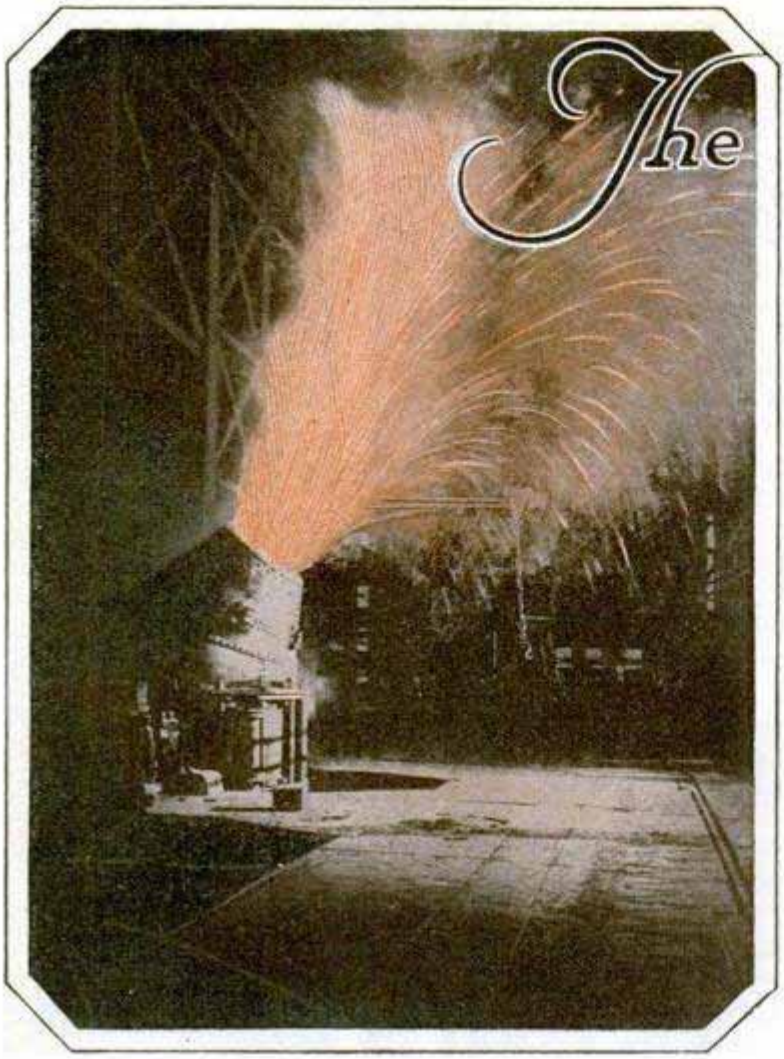
Realistic imitations of the northern lights were produced for a convention display in Florida recently, by means of a sixty-inch searchlight of nearly one and one-quarter billion candlepower. The beams were made to flicker back and forth across the sky, and the light was set on a rotating base to make the effect more natural.

HOW TO TELL GENUINE HOSIERY FROM IMITATION

Full-fashioned hosiery has a seam from top to toe, fashion marks under the knee and on the calf of the leg in two lines parallel to each side of the seam and under the instep and in the heel, a heel of distinctive boxlike structure, a diamond-point toe and an opening in the seam at the inside thickness of the garter welt. The legs and feet of such stockings are knitted separately. Imitation hose differ in that the leg and heel are made on a circular knitting machine, the ankle being shaped by cutting out a portion of the material, and the instep, sole and toe are shaped by machine. The seams are sewed in. On seamless or circular-knit stockings, there is no seam along the bottom of the foot and the imitation fashion marks do not appear at heel or instep. The federal trade commission has warned agents of the mills that they must not sell the imitation varieties as "fashioned" or "full-fashioned" hosiery.

¶Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information.

642. Mrs Charles Phelps Cushing, 138 W. 65th St. New York.



The Unsung

© U & U.

Henry Bessemer Was Laughed at by Steel Makers When He Invented the Converter, Here Seen as It Appears in Action

"I HAVE more men," said Henry Ford, in a recent interview in London, "making machines to build cars than I have making cars."

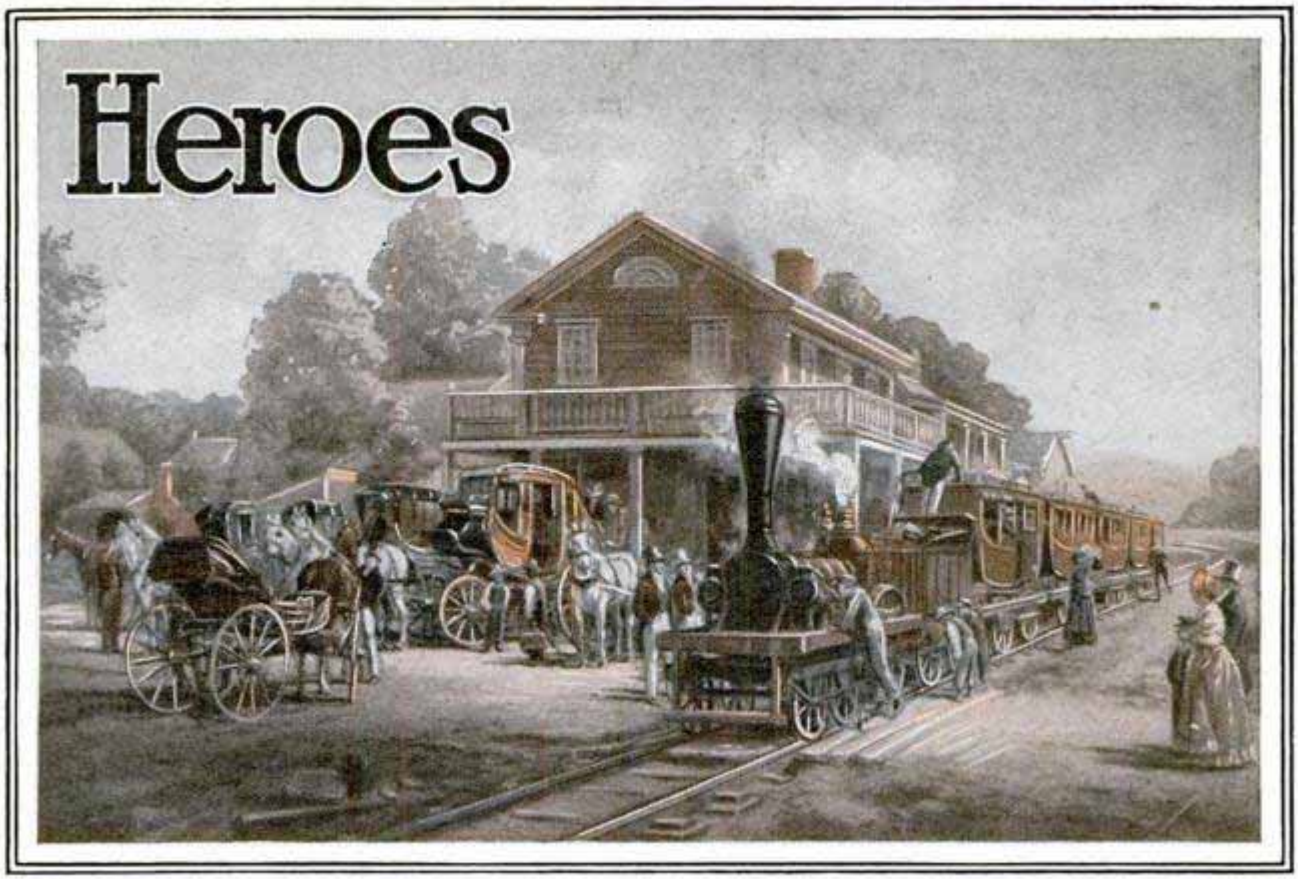
Summed up in that simple announcement is the story of the unsung heroes of industry—the men who build the machines that make modern necessities, conveniences and luxuries possible.

The man who operates the giant power press which turns flat sheets of steel into full-crowned fenders for a fine automobile is a romantic figure in a Pennell etching, but how many have heard of the man who made the press, and therefore made the fender possible?

Ford acquired one of the most remarkable, and least known businesses in the modern world when he bought the Johansson gauge company, and began making fine precision gauges in America. They turn out blocks of steel so perfectly machined that, when several are piled on top of each other, every atom of air is excluded from between them and they stick together like a single bar. Yet, to others than the men who use the gauges, the name Johansson is practically unknown.

More than 200 pounds' weight can be hung from a pair of Johansson gauge blocks "wrung" together to exclude the air. A pile of a dozen or more can be held out horizontally, gripped by the end block, and they remain as firm as a single rod. Carl E. Johansson was a foreman in the Swedish government arsenal at Eskilstuna, Sweden,—one of the world's most famous fine-steel cities and the modern rival of ancient Toledo and Damascus—when he conceived the idea of producing gauge blocks in a variety of standard sizes so that a wide range of gauges could be built up from a small number of blocks, in much the same way as a complete range of scale weights can be assembled from a few standard units. That was in 1897, but it was not until 1911 that Johansson was able to make the blocks in commercial quantities with absolute accuracy. Today they are standard throughout the world and a machine part made in America to Johansson gauges will correspond exactly to a similar part made in any other country.

History has had a habit of overlooking the men who stuck to their regular jobs and made the world's greatest triumphs possible. Every school boy learns the story of John Brown, who had a big hand in starting the Civil war, but few ever heard of another Brown, whose first initial also was "J," who had a big hand in winning it. The unknown J. Brown was the founder of the Brown & Sharpe



© C. Klackner

The First Railway Coaches Were Modeled after the Stagecoach, Just as, in a Later Day, Designers Thought a Copy of the Buggy Was the Best Shape for an Automobile

company, one of the world's greatest firms of tool makers.

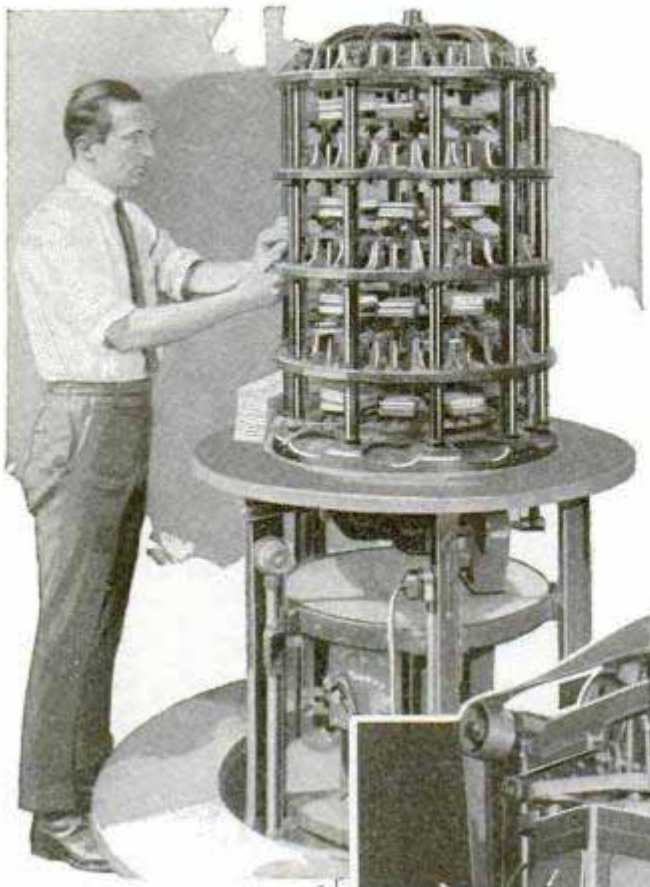
His part in the winning of the Civil war was the invention of the universal milling machine that turned out the rifle barrels for the Union army in the government arsenals. It did away with the slow and laborious rat-tail-file method and produced better musket barrels than had ever been made before. Joseph Brown never got credit for winning a single battle, and he never asked for it.

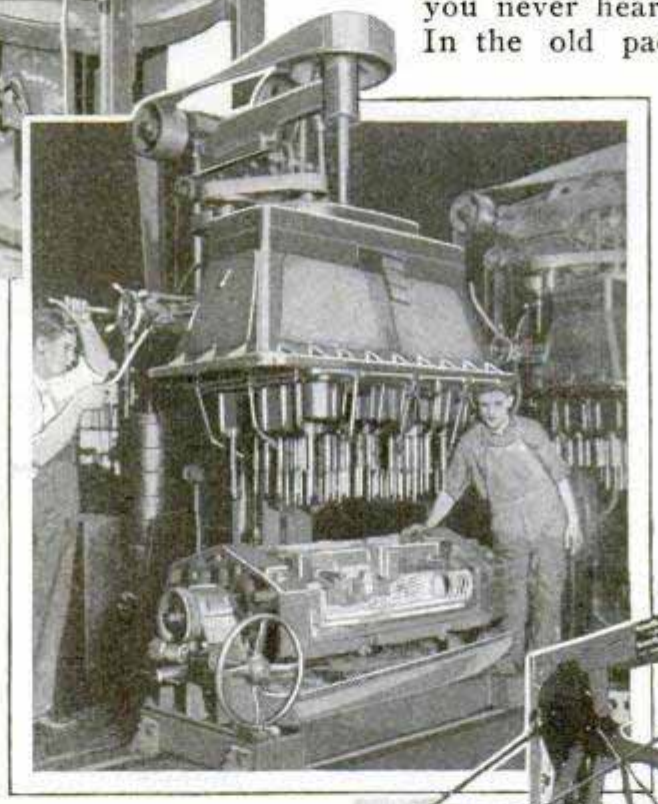
"The only thing that will put real prosperity into this country is machinery," said Henry Ford. "People believe that machinery brings idleness, but it is really the other way about. It will produce work. For the making of machines means the making of more machines, consequently there is more production, and better wages are paid."

The World war, like the Civil war, was won by men who never saw the battlefields or smelled powder. Marshal Joffre's fleet of taxicabs that turned the tide in the first battle of the Marne and saved Paris, was the product of many motor-car manufacturers, but the men who made the taxicabs possible were Johansson with his gauges and the inventors and builders of gang drills, power presses, turret lathes and the rest of the machinery of our modern factories.

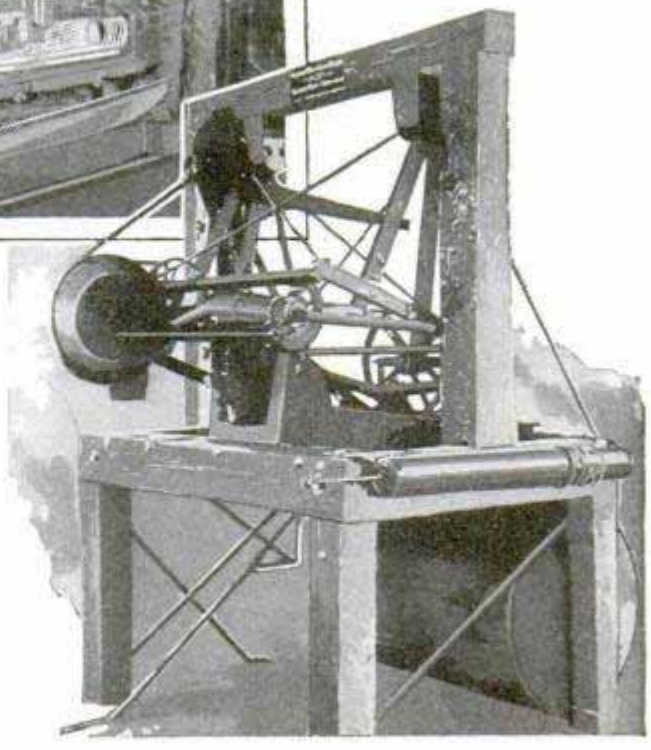
Even the woolen clothes of the armies originated in a machinery designer's head. One power loom can turn out as much cloth as could be produced by 45,000 of the most expert colonial dames of Washington's day, laboring at their hand looms and spinning wheels. The armies wore lots of cotton, too. A modern one-man cotton gin can duplicate the effort of 28,000 southern slaves in the old days. A power sewing machine, one of the most wonderful devices in the world, can sew together two pieces of cloth with a perfect lock stitch, with nine threads feeding and four needles going all at once, as fast as a man can steer the cloth over the slot.

The armies smoked ready-made cigarets instead of rolling their own, and could afford to do so on even a soldier's pay. The reason lay in another machine that rolls, wraps and packs 600 cigarets a minute, where the best hand labor could not do more than four in the same time.





Machines That Almost Think Are Not Unusual; Above Is a Sorting Machine for Statistical Records, Designed by John K. Gore, Vice President and Actuary of the Prudential Insurance Company; in the Center Is a Gang Drill That Drills an Entire Cylinder Block in One Operation



The Original Model of Blanchard's Gunstock Lathe, First Machine to Turn Eccentric Forms from Wood

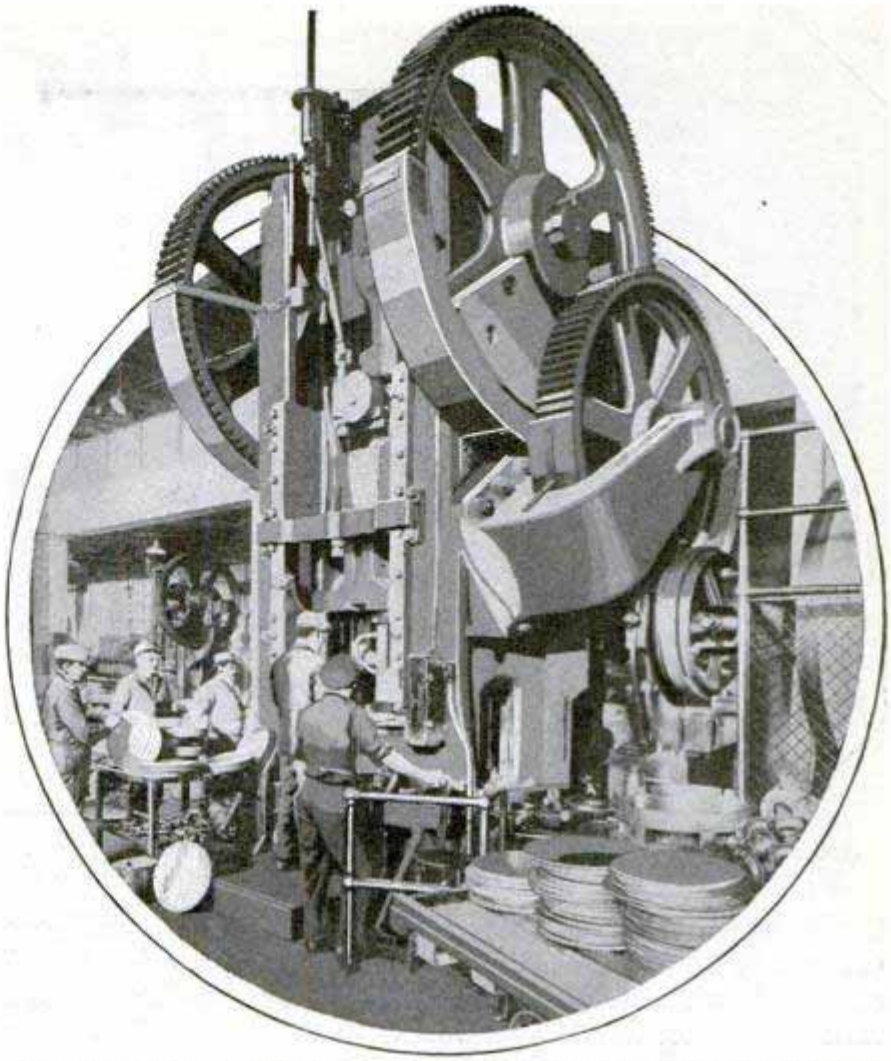
And so all down the line. All kinds of manufactured products are cheap to the consumer because the manufacturers can equip their plants with highly efficient and not too costly machines. And where do the ideas for the new machines come from? Listen to a Bridgeport tool maker's explanation:

"Our customers make suggestions, and we think of plenty more ourselves, in the way of improvements on all models. For another reason, whether we like it or not, we've got to try to keep ahead of our rivals, if we can, in turning out machine tools which will operate with the greatest possible economy and efficiency and speed. In the last war, they had a machine that was about the most wonderful automatic machine in the world. It did seven operations in testing cartridges—seven operations all in one machine! Some machine-tool builder designed that, but you never heard of him, and when the war decorations were passed around, he didn't get one. Nobody ever thought of decorating him.

"You've heard about Watt, I guess. He gets all the credit for giving the world the steam engine. But did you ever hear about John Wilkinson? Well, the steam engine was a commercial success for just one reason—John Wilkinson's boring machine made it feasible to build a steam engine that would work. I'll tell you another thing one of our tribe did. I'll bet you never heard of James Nasmyth. In the old paddle-wheel steamship days they put up to Nasmyth the man's size job of delivering a paddle shaft thirty inches in diameter. He turned the trick, but he had to build the first steam hammer to do it. The ship that needed the thirty-inch shaft never got finished,

because about that time the screw propeller came in and put paddles out of business. But we're still using steam hammers.

"We do a lot of inventing. Sometimes it is a machine ten thousand times as powerful as any of the battering rams used at the siege of Troy. Sometimes a machine to shave a ten-thousandth of an inch off a piece of steel. We've got a caliper in our plant so delicate that the heat of the palm of your hand, from several inches away, will cause it to expand. We can put on a show with stunts like that which would make anyone's eyes stick out."



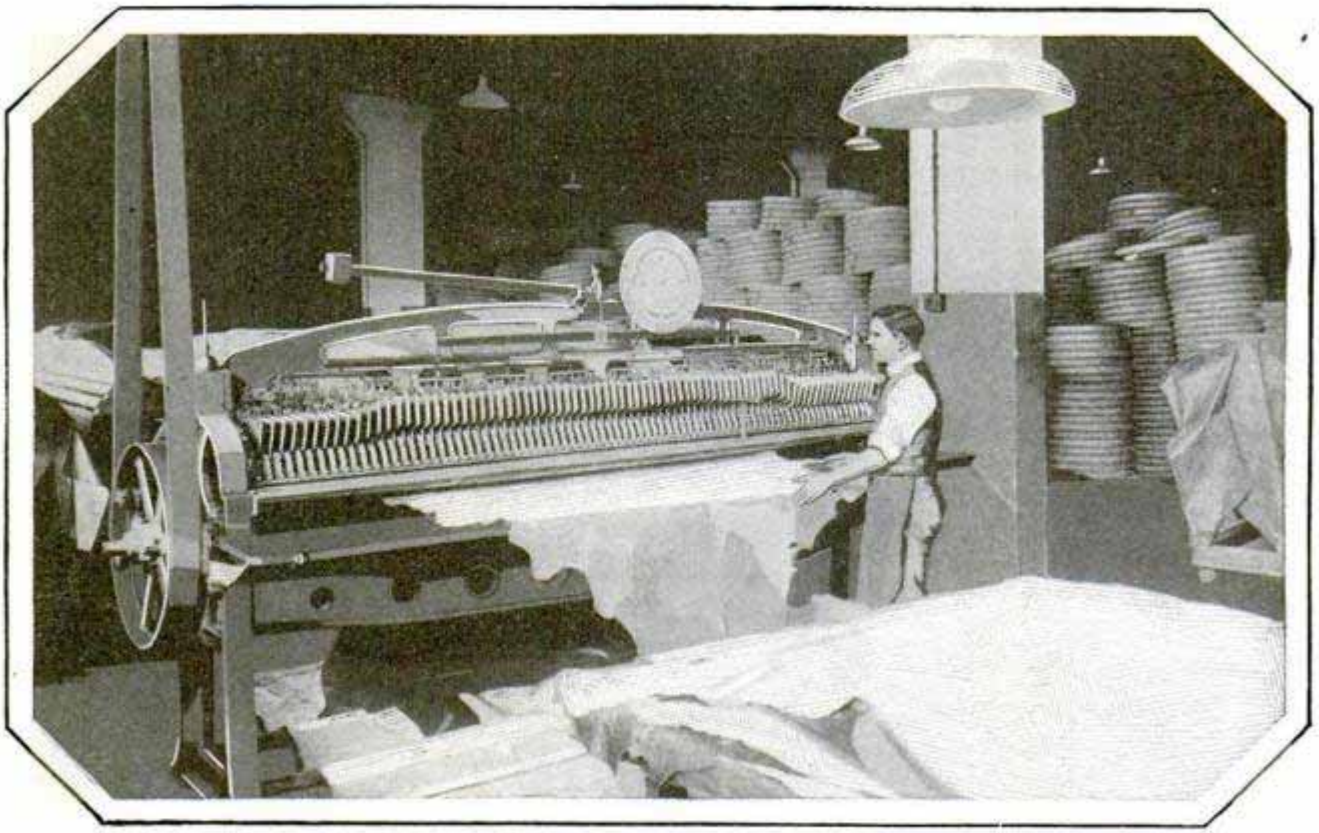
Weighing 170,000 Pounds and Exerting a Pressure of 1,100,000 Pounds, This Huge Press Makes Automobile Brake Drums from Flat Steel Disks

Joseph Brown, of Bridgeport, was not the only New Englander who turned an inventive mind toward producing machines to make work easier. In fact, much of the early reputation of Yankees, and particularly Connecticut Yankees, was based on their aptitude for taking the drudgery out of work by making a machine do the same task in less time and in a better way than human hands could turn the trick.

It was Amos Whittemore, of Massachusetts, who relieved thousands of New England families of their occupation of sticking wire staples, one by one, into sheets of leather to produce cards for cotton and woolen factories. Whittemore invented a machine which did the work, made a fortune by his invention, and thereby helped introduce the power era, in which the former card makers became more productive workers and the cost of cloth was correspondingly cheapened.

Another Massachusetts boy, Thomas Blanchard, turned machine builder at such an early age that he was only thirteen when he brought out an apple-paring machine that could out-pare more than a dozen girls. Blanchard, even younger, had won local fame for his skill as a whittler, making marvelously complicated water wheels and windmills. On the strength of his apple-parer triumph, his brothers took him into business in their tack factory. The making of tacks in those days consisted in stamping blanks out of a thin sheet of iron, then picking up the blanks, one by one, between the thumb and finger, and sticking them into a vise operated by a pedal, following which a lusty hammer blow flattened the part projecting above the vise into a head.

Young Blanchard's daily task called for a certain number of tacks, and they had to be counted to make sure he was producing his full quota. His first improvement was a counting machine, a ratchet-and-pawl affair that moved the toothed wheel one tooth for each time the foot-treadle vise was closed on a tack. Next he started work on a tack machine, and in six years produced one that turned out 500 tacks a minute. His patent brought



Another Machine That Thinks Thoughts the Human Brain Could Not Compass; It Automatically Measures the Square Inches in an Irregular Cow Hide and Gives the Total

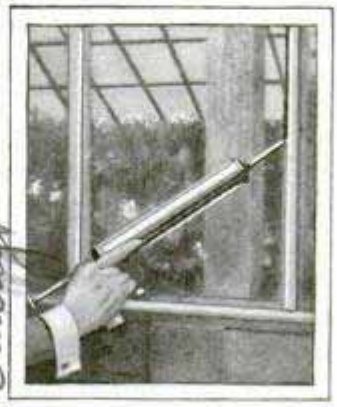
him $5,000. With that money he started in earnest to be a manufacturing machinist, and used part of it to build a machine for turning musket barrels, an operation that was simple enough, except at the breech, where the flat and oval sides had to be ground down or chipped off. Blanchard produced a lathe that did the job satisfactorily. While he was exhibiting it at the government arsenal in Springfield, Mass., a musket-stock carver remarked he had one job that could never be spoiled by any machine designer. Blanchard accepted the challenge, and in six months produced the first woodworking lathe for turning objects of irregular shapes. Under his basic patents, lathes are turning out gunstocks, shoe lasts, hat blocks, tackle blocks, ax handles, and a thousand other objects of irregular form.

Most of the early power machines were developed to make possible some specific product; in other words the machine was designed to fit an immediate need, and the need came first.

But machine building has become such a highly developed art that now the improvements frequently precede the demand from the manufacturer. Turret lathes, boring and milling machines, gang drills and power presses are constantly being improved with the addition of new gadgets that extend their usefulness into new lines, speed up production, increase accuracy, or simplify the work to the point where an untrained laborer can equal the product of a highly skilled mechanic of former years.

But, through it all, the men who make the machines remain virtually unwept, unhonored and unsung.

AUTOMATIC GUN FOR CALKING LEAVES ONE HAND FREE



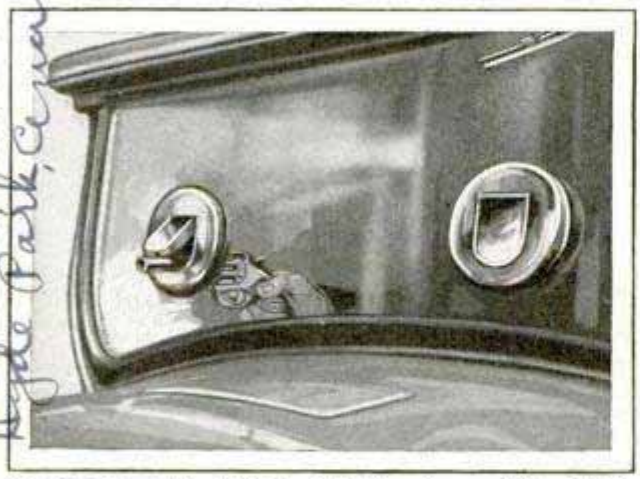
Operated somewhat like a pistol, a gun for calking or glazing applies the material just where it is wanted and permits the operator greater freedom than with other tools, as he needs but one hand. A large cylinder holds a generous supply of putty or filling substances, and ejection is accomplished simply by pressing a trigger.

FORECAST WEATHER FOR WEEK BY IMPROVED SYSTEM

Methods of predicting weather changes a week in advance, and with an accuracy almost as great as that for the daily forecasts, have been developed by C. L. Mitchell, district forecaster of the weather bureau. More time and preparation are required, but he considers the results worth the extra work involved. On a blank map of the northern hemisphere, he locates the high and low-pressure centers of the current and the three preceding mornings, with the pressures indicated at the centers. These centers are then connected with lines, showing the day-to-day changes in the intensity of the areas and the variations of the low and high-pressure regions. With this as a basis, the locations of the centers likely to affect the weather of the eastern half of the United States are predicted and entered on a chart for each day, a week in advance. On 201 days of the 276 for which forecasts were made two to seven days in advance, the weather changed as predicted, giving an accuracy of more than seventy-two per cent. The record for official daily forecasts is about eighty-two per cent.

PORTHOLES IN WINDSHIELD HELP IN BANDIT CHASE

Cincinnati police have automobiles with bullet-proof windshields and with two portholes in the shield, so that persons in the cars can fire at bandits without exposing themselves to a return volley. The autos are capable of high speed.



Portholes in Windshield of Police Automobile Aid in Bandit Warfare; and the Glass Is Bullet-Proof

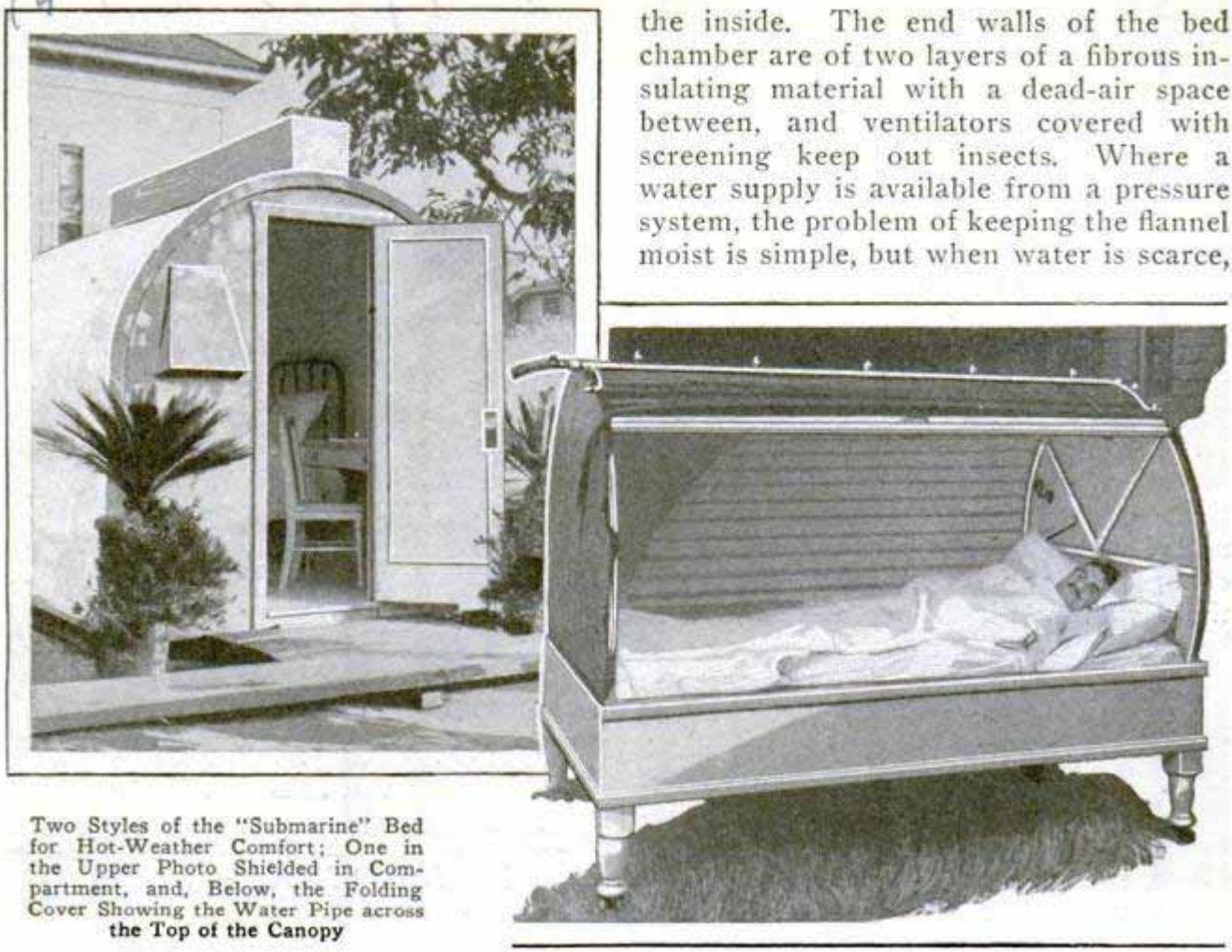
Giving the Hedge an Even Trim with Collapsible Cutter That Saves Time

ACCORDION CUTTER FOR HEDGES LEAVES SMOOTH SIDES

Trimming the hedge is simplified, according to reports, with a trimmer that has nearly 100 inches of cutting edge and is operated like a collapsible bracket with two handles. One man can trim from fifty to 100 yards of hedge an hour with it, and there is less likelihood of leaving irregular edges.

GREATER SAFETY IN SUBMARINE THROUGH IMPROVED DESIGN

Had the "S-4" been equipped with safety devices developed since the vessel was sunk, it would have been possible to rescue the crew, in the opinion of L. Y. Spear, a naval architect who testified before the special senate committee investigating the disaster. He said that the "S-4," which was built in 1916, had all the safety features of that period, but since then great developments have been made, increasing the chances of rescuing the crews on sunken submarines. Auxiliary and emergency controls and air locks to permit the escape of entrapped men are among the improvements, while boats of the latest hull designs are better able to withstand pressure and weight.



Two Styles of the "Submarine" Bed for Hot-Weather Comfort; One in the Upper Photo Shielded in Compartment, and, Below, the Folding Cover Showing the Water Pipe across the Top of the Canopy

SUBMARINE BED GIVES COMFORT ON ~~HOT~~ NIGHTS

Being unable to sleep because of the hot nights, a western engineer has inclosed his bed in a galvanized sheet-steel canopy, covered with flannel which is kept moist with water. The resulting evaporation produces a comfortable temperature on the inside. The end walls of the bed chamber are of two layers of a fibrous insulating material with a dead-air space between, and ventilators covered with screening keep out insects. Where a water supply is available from a pressure system, the problem of keeping the flannel moist is simple, but when water is scarce, a small electric pump is used to return the supply to a storage tank. The water falls on the canopy through perforations in a pipe along the roof of the compartment. A wooden roof or canvas canopy keeps the rays of the sun from the chamber during the day. The arrangement has become popular in California and Arizona, especially in sections below sea level.

HANDLE ON STEERING WHEEL IS AID TO AUTOIST

Attachable to the steering wheel of almost any make of automobile, a grip handle is said to promote greater ease and safety in driving. It affords added leverage and allows the operator to assume a more comfortable position. In many cases, it is said to make it unnecessary to lean forward and does away with the use of a small pillow, which some women drivers find essential.

RETOUCH MOTION-PICTURE FILM WITH LESS EYE STRAIN

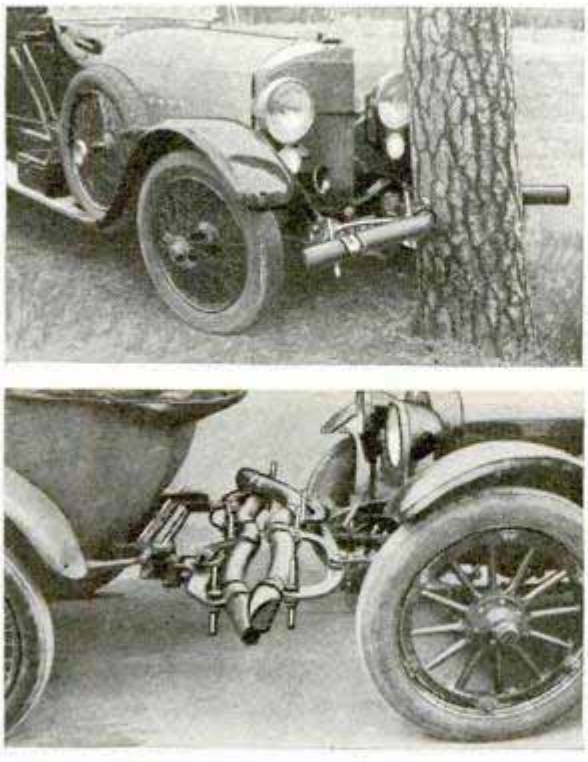
Retouching motion-picture film has been simplified with the aid of an apparatus developed in France. Instead of looking directly at the negative, as in the ordinary process, an image of the film is projected upon a screen, along with the image of the retouching pencil, so that the worker may more easily perform the task and see small details that might otherwise be overlooked.

RADIO REPLACES HUMAN ALARM IN WAKING PEOPLE UP

A picturesque "institution," the man with the long pole who shuffled along the streets and knocked at workers' windows to arouse them at the proper time, is rapidly being forced into the discard at Lancashire, England, by radio. Alarm clocks foretold his passing several years ago, yet many old-fashioned folk still clung to the walking arouser. But now that time signals are broadcast by radio and clocks can be adjusted several times each day, the "man with the pole" is rapidly becoming extinct.

RUBBER AUTO BUMPERS GUARD CAR AND PASSENGERS

Interesting tests of rubber automobile bumpers were made in Germany recently. A car was driven into the rear of a parked auto at a speed of twenty-four miles an hour, but its rubber bumper prevented damage to either vehicle, and in another demonstration, an automobile was run directly into a tree at a speed of thirty-six miles an hour. According to reports, neither the car nor the driver was injured. The bumpers give under strain, acting as shock absorbers in case of collisions.



Results of Crashes in Car with Rubber Bumper; Only Slight Damage Was Suffered

Aviators with the Four-Lens Camera for Taking Photographs from the Air

FOUR-LENSED AERIAL CAMERA TO SPEED MAPPING

Greater speed and accuracy in preparing air maps are anticipated with an aerial camera that has four lenses. It was recently subjected to field tests by army flyers before mapping an area of approximately 2,500 square miles along the east coast of Florida.

SUBMARINE FOR POLAR TRIPS TO AID OCEAN STUDY

Exploration of polar regions by means of submarines is considered practical. Stefansson suggested the plan in 1918, and just recently, Capt. George H. Wilkins indorsed the idea. He declares that a submarine should be able to cruise from Spitzbergen to Alaska and that the craft would be useful in making investigation of ocean currents. Explorers believe that there is little chance of finding new lands at the pole, as air surveys have shown the region to be mostly ice and water.

Half Around the World

Bert Hinkler, Who Flew a Light Plane on a Solo Trip from London to Port Darwin in Sixteen Days

IN the cold dawn of an early morning, an Australian pilot rolled back the doors of a hangar at Croydon field, just outside of London, wheeled out a tiny plane, opened up its wings, which had been folded back to park the ship in a space about the size of a family garage, and took to the air.

Sixteen days later—or a trifle more than fifteen, if you allow for the difference in time—he settled down to an Australian airdrome, having traveled, alone, 12,000 miles, or virtually halfway around the world. In a fraction over two weeks, Bert Hinkler, a comparatively unknown test pilot, had become famous, for he had:

Made the longest continuous solo flight in history.

Made it in a $3,000 airplane, powered with an engine rating but thirty horsepower, and developing eighty at its peak point.

Clipped twelve days off the air record from London to the antipodes.

Made the first non-stop flight from London to Rome.

Crossed seas, mountains, deserts and jungles and winged through tropical monsoons day after day while keeping exactly on his predetermined schedule.

At the age of thirty-six a flyer who, as a boy at Bundaberg, Australia, had saved his pennies to build gliders so that he could teach himself to fly, was holder of one of the greatest flying records ever made.

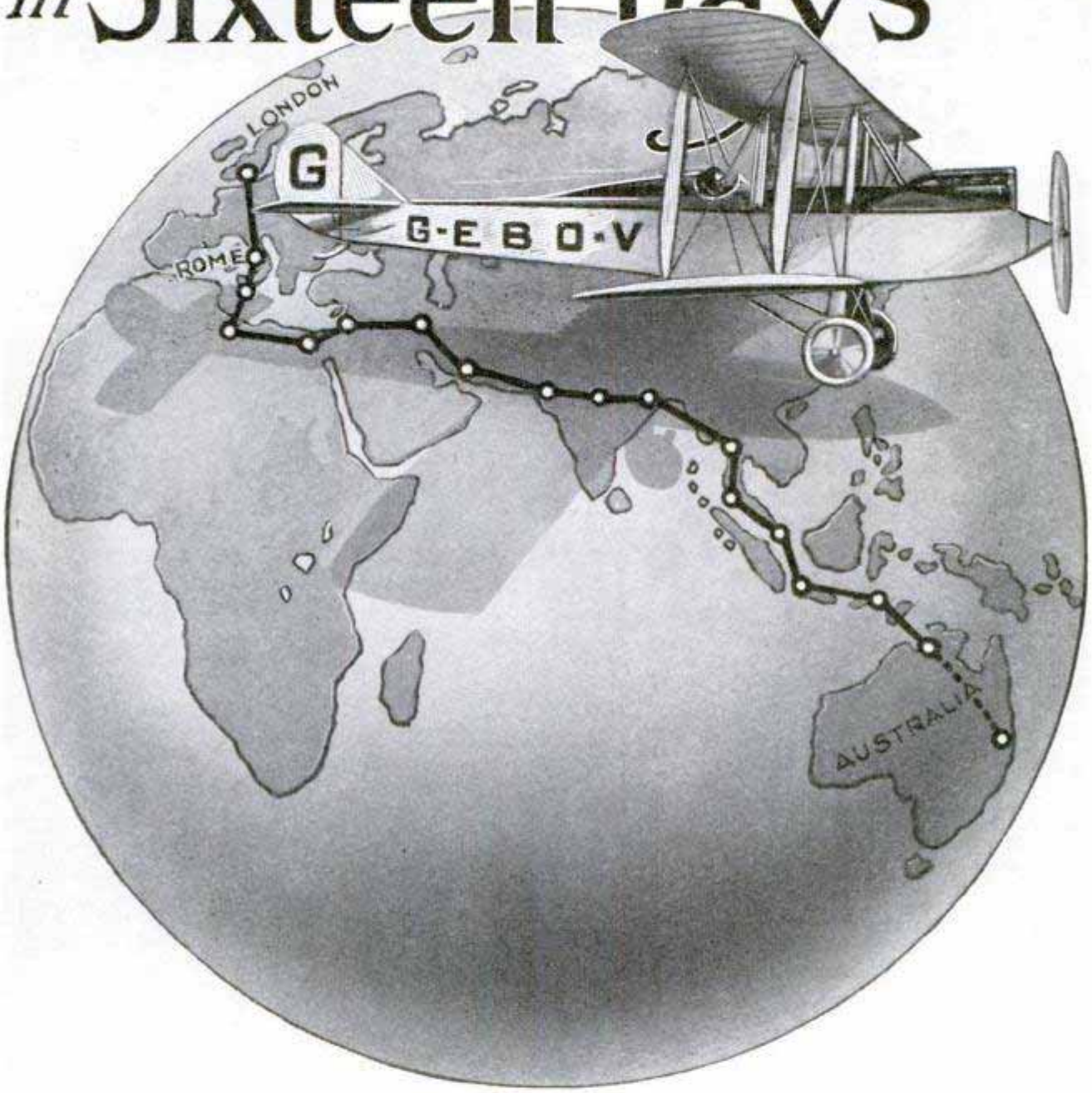
The London-Australia flight was unique in several ways. To begin with, instead of ordering a special ship, Hinkler overhauled his old Avro "Avian"—the first of the type ever built—which had already seen hundreds of hours in the air, including a non-stop flight of 1,200 miles from London to Riga, Latvia, last year. The original engine, never taken down, was given a "top overhaul" and pronounced ready. The original two-seater open fuselage had been converted, for the Riga flight, to carry only one passenger, with extra gasoline tanks in the spare seat, so no changes in it were needed.

A small supply of food and a collection of maps were the only added equipment. Wrenches, pliers, screwdrivers and a grease gun—about the usual tool kit for an automobile journey—composed the repair equipment. There wasn't even a spare tire for the landing wheels, and the tires reached Australia still filled with English air.

For cargo there was a variety of small articles, whose manufacturers had contributed to the expenses of the trip in exchange for the advertising. Hinkler's chances of breaking the twenty-eight-day record to Australia, set by Sir Ross and Keith Smith, in 1919, were considered so slim that the London papers refused to contribute to the expenses, though later they paid huge sums for brief cables from the pilot. Lloyds, for 150 pounds (roughly $750) had offered insurance against failure, to pay one pound if he broke the Smith brothers' record by one day, two pounds for two days, four for three days, and so on, doubling the amount for each

6 36

in Sixteen Days



Hinkler in His Avro "Avian," and the Route Followed in His 12,000-Mile Flight Half Around the World, When He Broke the Record for the London-Australia Flight

day, until they would have paid 2,048 pounds if he made the trip in sixteen days, as planned. Unable to raise the money to buy the policy, Hinkler lost the chance to make the more than $10,000 which his success would have earned.

With enough money raised to buy gas and oil, and pay his steamer fare back to England, he started out. Here, in his own words, is the story of the 12,000-mile jaunt in a $3,000 air flivver, with about the power of a medium-priced car.

"Dawn had not yet broken when, on the morning of Tuesday, Feb. 7, we struggled with a recalcitrant hangar door before wheeling the 'Avian' out on the tarmac. The final supply of gas was put aboard, the last goodbys said, and at 6:45 exactly, I took off into a slight cross wind on the first lap of the flight to Lyons or Rome, as the weather dictated.

"The first lap was in many ways the most critical one, for, as I was flying against the sun, I had little more than eight hours of daylight in which to cover some 1,100 miles. On the other hand, Europe, with its probability of bad weather and consequent delay, presented

the greatest obstacle to a fast flight to Australia and the sooner it was left behind the better.

"So I carried on throughout the day until, at about 5:50 p. m. local time, or 3:00 p. m., London time, the light began to fade and the rest of the flight over Italy was completed in darkness under a clear moon. There was no more welcome sight that night than the river Tiber and the lights of Rome as we landed at Centocelle aerodrome at 8:40, local time.

"After a hasty meal, the machine was 'serviced up' and greased for the morrow, and then I turned in, pretty well beat, for, owing to the exigencies of last-minute arrangements, I had less than three hours' sleep on the previous night.

"At 9:15 the next morning we left Rome for Malta, the British base in the Mediterranean, 400 miles away. The route first planned had been via Athens, Cyprus, Aleppo and Bagdad, but weather and other considerations induced me to choose the alternative route via Malta, where we arrived after several hours' uneventful flying. After a brief inspection of the machine and engine, I was able to revel in the luxury of a hot bath.

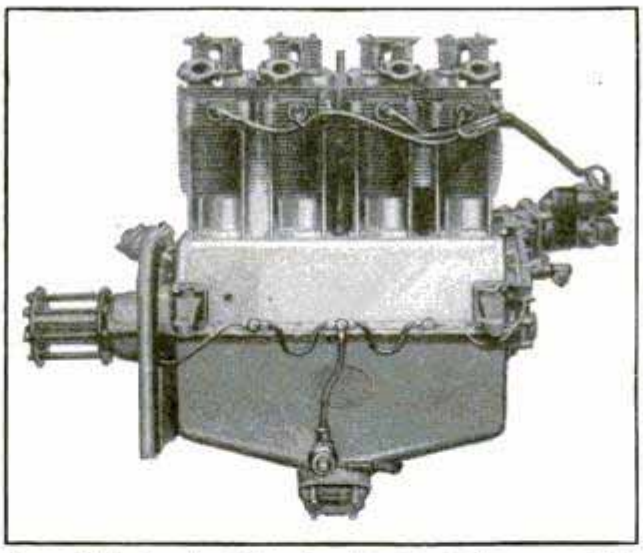
"Early the next day, the third out from England, I started crossing the sea. As with all these longish sea crossings, at first one feels a slight sense of anxiety as land disappears, but this soon vanishes. In flying over bad country, one is always subconsciously looking out for possible landing places. Over the sea, you at least have the relief that any place is as good, or as bad, as another.

"We made a landfall before noon and landed at Benghazi, on the African coast, at 1 o'clock. Later in the afternoon, when it grew cooler, I flew on to Tobruck, resting place for the night, and 980 miles from the morning's start at Malta. It was on this lap that I had my first experience of the seemingly endless monotony of sand, which we never seemed to escape until Karachi, India, was reached. Here, too, began the clothes-discarding process which, as we neared the equator, continued steadily so that I must have left an unbroken trail of garments behind.

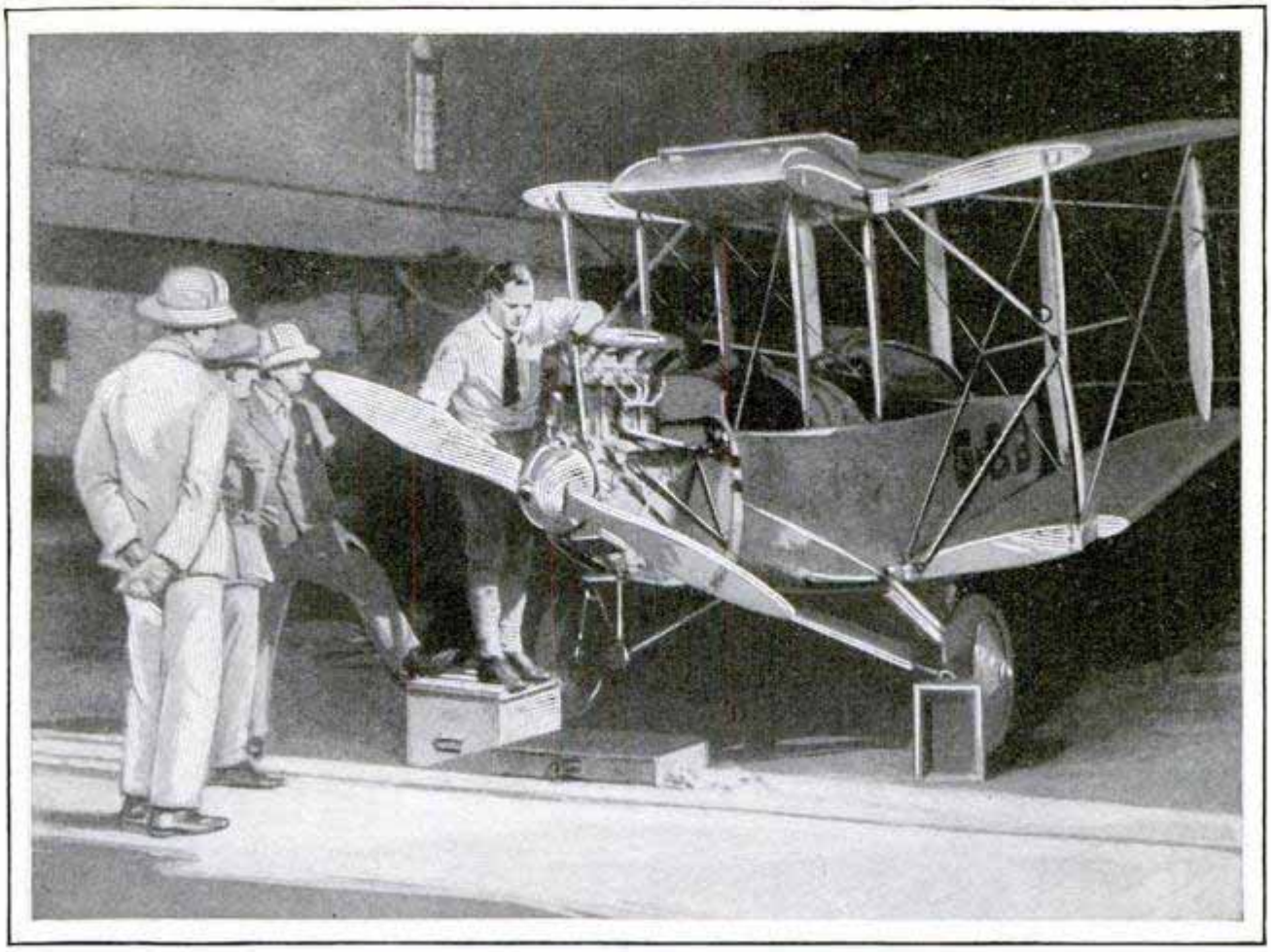
"This first hitch in my plans came the next day, the fourth out from London, for I was unable to get clear of the desert before nightfall, and the rapidly fleeting daylight forced me to land on a patch of desert overgrown with thorns. The next day I was preparing to clear away the thorns for the fairway when a party of Arabs approached. I felt a little anxious in case they might prove to be hostile, but a timely offer of cigarets sealed our friendship, and they finally helped me clear the ground of obstructions. Soon after, we took off and headed for Palestine and reached Ramleh airdrome in the afternoon, where I was able to give the engine the first real attention it had had since leaving Malta, more than 1,600 miles behind.

"The Persian gulf was the next objective, and the 1,000-mile stretch to Basra was the most monotonous of the trip, traversing the seemingly endless deserts of Syria and Arabia. After nine and a half hours of non-stop flying, I was thoroughly tired. The run next day was less tiring, and the 800-odd miles down to Jask village, on the gulf, was covered by 4 o'clock, local time. Jask was two miles from the landing field, and the only means of transport were a donkey and a bicycle. The donkey seemed rather defective on the rudder controls, so I eventually chose the bicycle and pedaled through the blazing sunshine to the luxury of a real long sleep.

"After a pleasant run down the coast, we reached Karachi, the first stop in India, and landed in the early afternoon, on the seventh day out from Croydon. I was



Four Cylinders in Line Are the Novel Feature of the Avro's Air-Cooled Engine



With Wings Folded Back, the "Avian" Occupied Small Space in the Hangar at Karachi, India, While Hinkler Overhauled the Engine and Prepared for the Next Day's Hop

able to deliver papers only a week old in Karachi, and here a slight leak in the oil tank was attended to. Throughout the flight this was the only repair I had to make to machine or engine.

"Flying conditions were good on the next lap, the 850 miles to Cawnpore, apart from some bumps encountered en route, and I landed on the military parade ground, after nine hours and thirty-five minutes of non-stop flying.

"The 650 miles to Calcutta were practically covered in the morning, and I landed at the Dum Dum airport at 1:25. Lette, a friend, was at Dum Dum to meet me and very sportingly spent the rest of the day giving me a hand. With every mile now, the heat increased, and we had already reached the stage where the fabric of the machine almost blistered one's fingers.

"From Calcutta onward, we entered the rainy area, and an East Indian rainstorm is no April shower! Instead of cooling one, they seem to leave the atmosphere more oppressive.

"I reached Rangoon in the afternoon, eleven days out, after covering the 780 miles from Calcutta in seven hours forty-five minutes, non-stop. By a detour at South Akyab, I had managed to dodge the worst of the rainstorms, but at Rangoon I was warned they were breaking all along the Malay coast.

"At 6:40 the next morning we left Rangoon and arrived at Victoria Point, 500 miles away in a direct line, at 2 o'clock, after a memorable flight, in which most of the time was spent in making detours to avoid rainstorms. As we neared our destination, I could see a big storm gathering behind, and at full throttle we raced in, flying low over the thickly matted jungle. A minute or two after landing, a heavy downpour blotted out the landscape, reducing visibility to less than a hundred yards.

"That night I passed in a rubber planter's bungalow, and I have a vivid recollection of going over the machine—pegged down on the edge of the jungle—with a flash lamp, while the thunder shook

Hinkler at Work on the Thirty-Horsepower Cirrus Engine, Which Had Already Flown Vast Distances

overhead and lightning lit the darkness of the jungle with sudden flashes.

"Nine hours' flying the next day brought us to Singapore. From Penang onward, we encountered many rains, and at Tiebad I was forced to make a fifty-mile detour. As we glided down to the race course at Singapore, at 4 o'clock, 720 miles from the day's start, I could see four Supermarine Southamptons, of the Far East flight, moored on the still waters of the harbor. Hundreds of coolies crowded the race course, and the machine narrowly escaped damage in landing and taxying in. Once again, all offers of hospitality had to be refused, and I retired early with my trusty alarm clock.

"The take-off from Singapore was probably the nearest thing in a reasonably uneventful flight, for the ground was sodden and the race course none too large. I managed to clear the buildings by a narrow margin, and headed away to Java. As we arrived over the island, heavy rainstorms closed in from all sides, and I was forced to hang around for nearly an hour before landing at Kalidjati (near Bandoeng and fifty miles east of Batavia) at 3:45, local time.

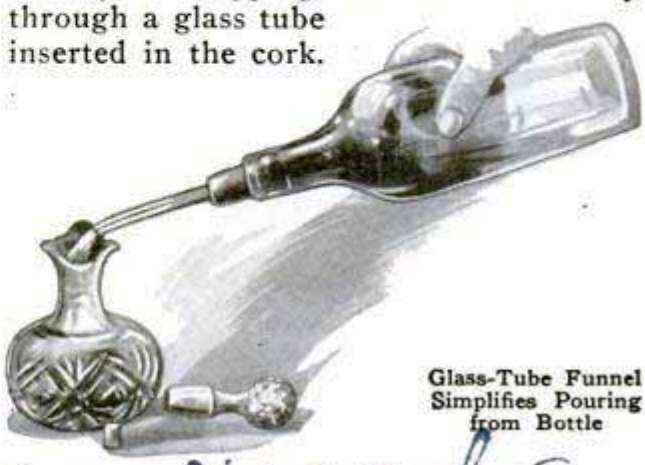
"Then, after an uneventful trip, I landed at Bima the next afternoon, and my lodging for the night was a native's hut, and all night long mosquitoes attacked in mass formation, rendering sleep impossible.

"Early the next morning we set out on the final 1,000 miles that lay between us and Australia. The shortest course from Bima to Bathhurst island lay over the open sea nearly all the way, but the engine was running like a dream, and I felt no anxiety. Good weather prevailed all the way and the last 100 miles over the open sea were uneventful.

"My joy when I made the landfall at Bathhurst can be imagined. It was 5:45 when I changed the course for Fanny bay, the landing place, five miles from Port Darwin. Before landing, I circled the Ross Smith memorial, in tribute to a great pioneer, and then landed on the crowded airdrome. I had reached Australia on the sixteenth day of the journey, and, allowing for the difference in local and Greenwich time, after a little more than fifteen elapsed days from the start."

GLASS TUBE IN BOTTLE CORK SERVES AS FUNNEL

Pouring liquids from bottles without spilling or dripping can be done easily through a glass tube inserted in the cork.



Glass-Tube Funnel Simplifies Pouring from Bottle

It serves as a funnel and is especially useful in filling storage batteries to prevent the acid from getting on the floor.

SOUND WAVES BORE HOLE IN GLASS

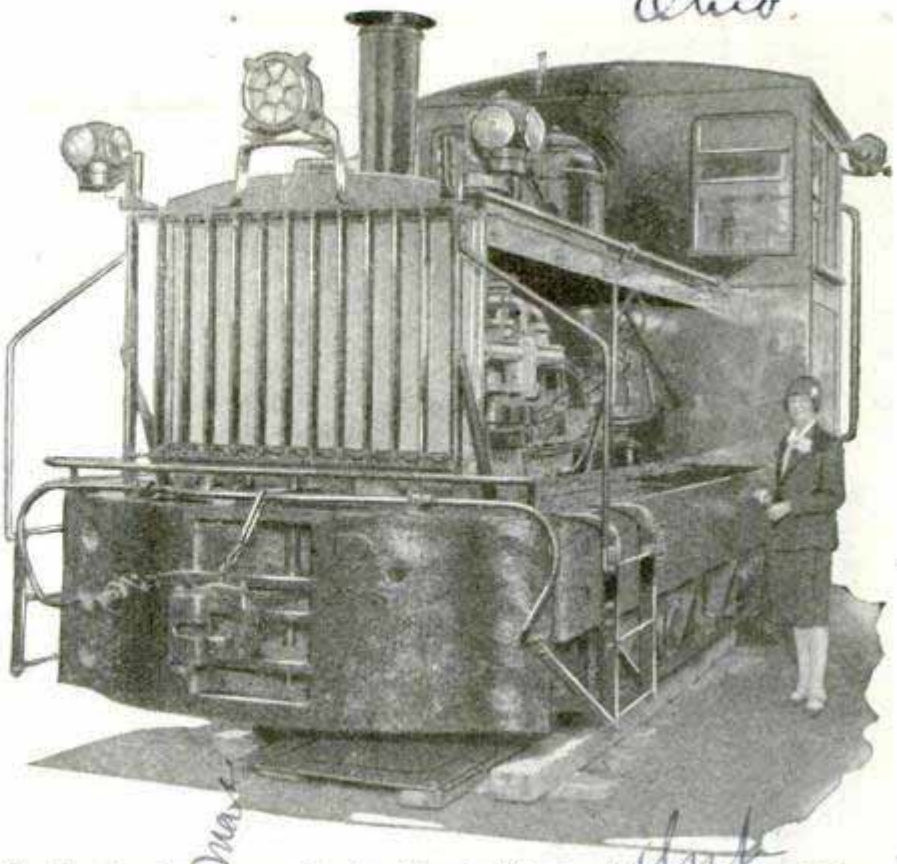
Sound waves of a frequency of 200,000 to 500,000 vibrations a second, passed along a tapering glass rod, caused the tip to bore a hole in a piece of wood and a plate of glass, a French experimenter discovered recently. When the waves were communicated to a glass thread about one one-hundredth of an inch thick and more than a yard long, the frictional effect was so intense that the flesh could be burned. Further tests with the "ultra-sonic" waves showed that they accelerated various reactions and produced crystallization.

RAZOR-BLADE "PARKING" SPACE PREVENTS CUT FINGERS

Storage space for used safety-razor blades is provided in a china holder that has a groove for the razor and another compartment for new blades. The discarded units are removed simply by turning the cabinet upside down and shaking it.

ARTIFICIAL SILK FROM COAL

Among the by-products from coal at a German plant is viscose artificial silk, several tons of which were produced this year. The amount is expected to be doubled when new factories are completed in 1929. Benzine has also been extracted.



Gasoline-Burning Locomotive for Terminal Service That Has Found Favor Because It Reduces Smoke and Noise

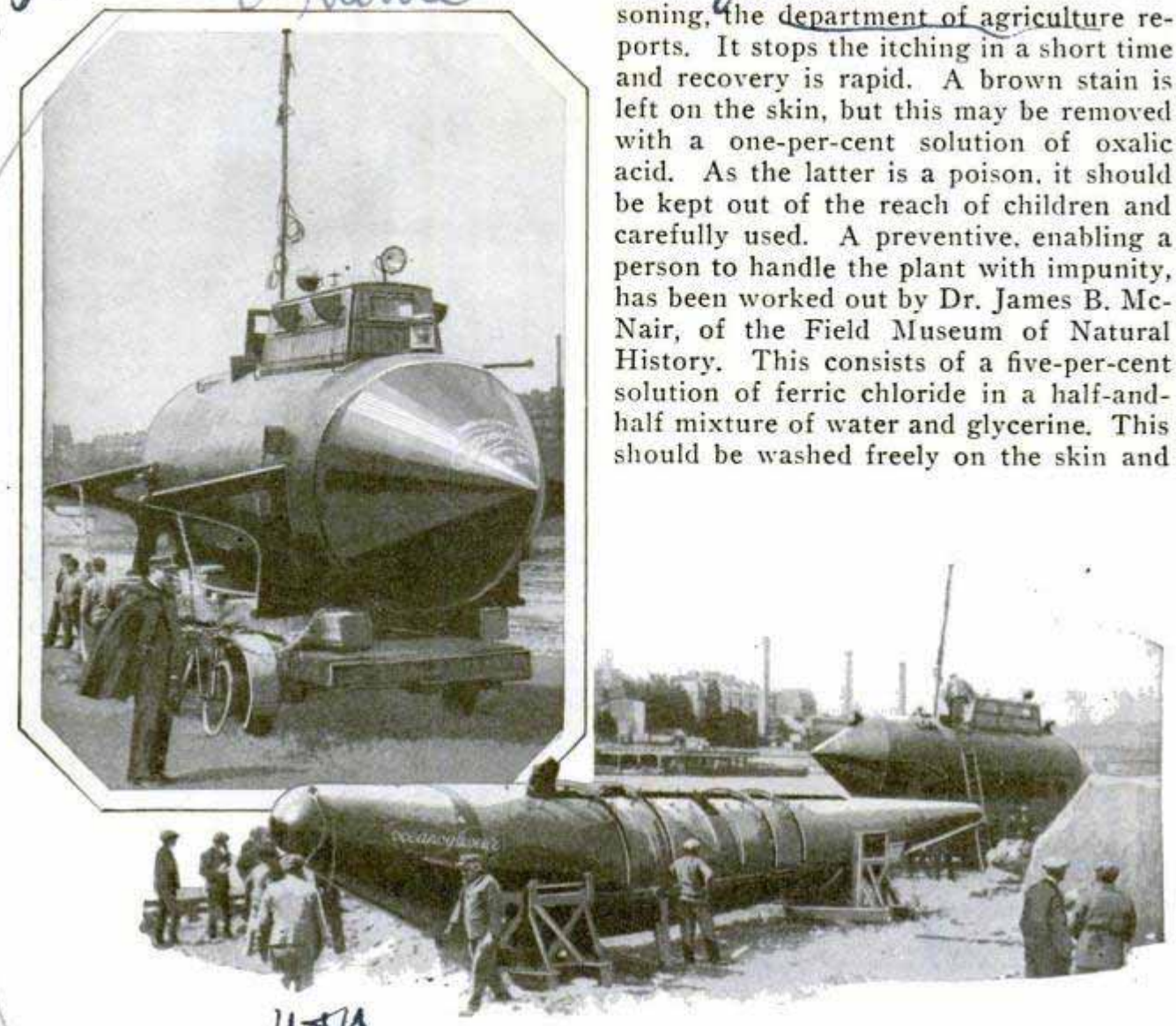
RAIL ENGINE BURNS GASOLINE AND SPEEDS SWITCHING

One of the latest developments in locomotives was exhibited in Los Angeles recently in a huge gasoline-burning unit especially adapted to yard service. Quicker handling of trains and cars in switching, and less noise and smoke, are important features of these engines.

AUTO CLOCK ON GEAR LEVER REPLACES KNOB

In line with the tendency toward greater simplicity and compactness in dash equipment, the automobile clock is now attached to the gear-shift lever, serving as a substitute for the usual knob. A small spring in the back absorbs the vibrations, and the hands are visible at night. The crystal is of the unbreakable variety.

soning, the department of agriculture reports. It stops the itching in a short time and recovery is rapid. A brown stain is left on the skin, but this may be removed with a one-per-cent solution of oxalic acid. As the latter is a poison, it should be kept out of the reach of children and carefully used. A preventive, enabling a person to handle the plant with impunity, has been worked out by Dr. James B. McNair, of the Field Museum of Natural History. This consists of a five-per-cent solution of ferric chloride in a half-and-half mixture of water and glycerine. This should be washed freely on the skin and permitted to dry there before going into an ivy-infested region. This compound contains iron, which enters into a chemical combination with the ivy poison, rendering it harmless.



Pilot House and Body of the Glider before Launching; in This Queer Craft, Equipped with a 700-Horsepower Motor, a French Inventor Hopes to Cross the Atlantic in Sixty Hours or Less

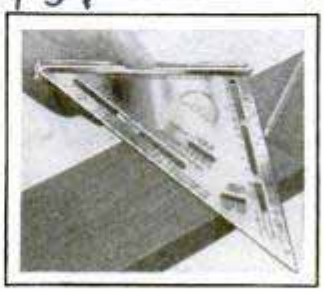
BIG MOTOR BOAT LIKE TORPEDO FOR TRANSATLANTIC TRIP

Seventy-five feet long and equipped with a 700-horsepower motor, a torpedo-shaped "glider" is the strange craft in which a French experimenter hopes to cross the Atlantic. It will develop a high rate of speed and its form reduces resistance from air and water to a minimum. It is made almost entirely of metal and was designed especially for rapid trans-oceanic postal service.

CHEMICALS FOR IVY POISONING ARE EFFECTIVE

Potassium permanganate, applied as a five-per-cent solution to afflicted parts with a soft cloth or a bit of cotton, has been found an effective cure for ivy poi-

SQUARE FOR CUTTING RAFTERS AIDS ROOF BUILDERS



To simplify the task of cutting rafters, a special square is marked so that the proper angle to give the pitch desired is quickly and accurately obtained. This is accomplished with the aid of numbers on the square which designate the inch rise per foot on the rafter.

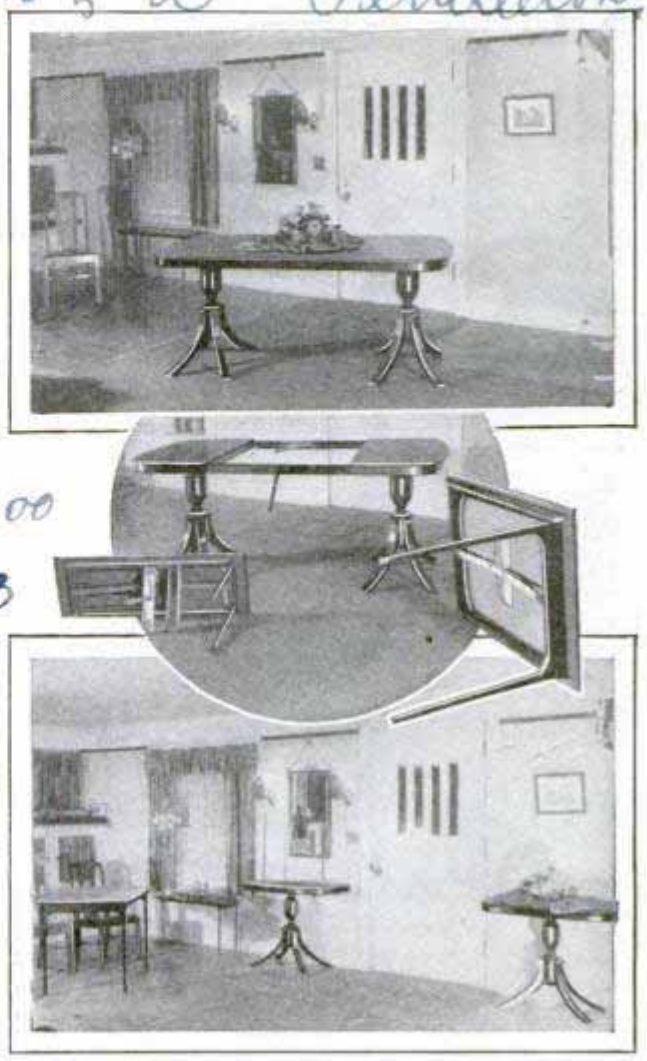
THREE-WHEEL-BRAKE SIDECAR PROMOTES SAFER RIDING

Intended especially for service in the cities where frequent stops are necessary, a three-wheel-brake motorcycle sidecar has been introduced. The brake to the sidecar operates in conjunction with the pedal which controls the cycle's rear-wheel brake. Equalization of all brakes is effected with less danger of skidding and with reduction of wear on the tires. A regular motorcycle front wheel is employed instead of the usual sidecar wheel.

CHILD'S PIANO-PLAYING GUIDE SIMPLIFIES INSTRUCTION

Nursery rhymes, simple melodies and the piano are associated in a helpful guide for youngsters to enable them to play the instrument and become familiar with some rudiments of music. The unit is simply a large card, bearing an attractive picture, and the rhyme and notes to the jingle at the top. The bottom portion is slotted to fit over the piano keys and the card is bent when in use, the upper part being upright and the lower flat over the keys. Below the slots are holes for the fingers. These are numbered to correspond with the figures on the notes of the little song. Thus the child can quickly learn to associate the note with the proper key on the piano and memorize the words.

Practicing with the Piano-Playing Guide



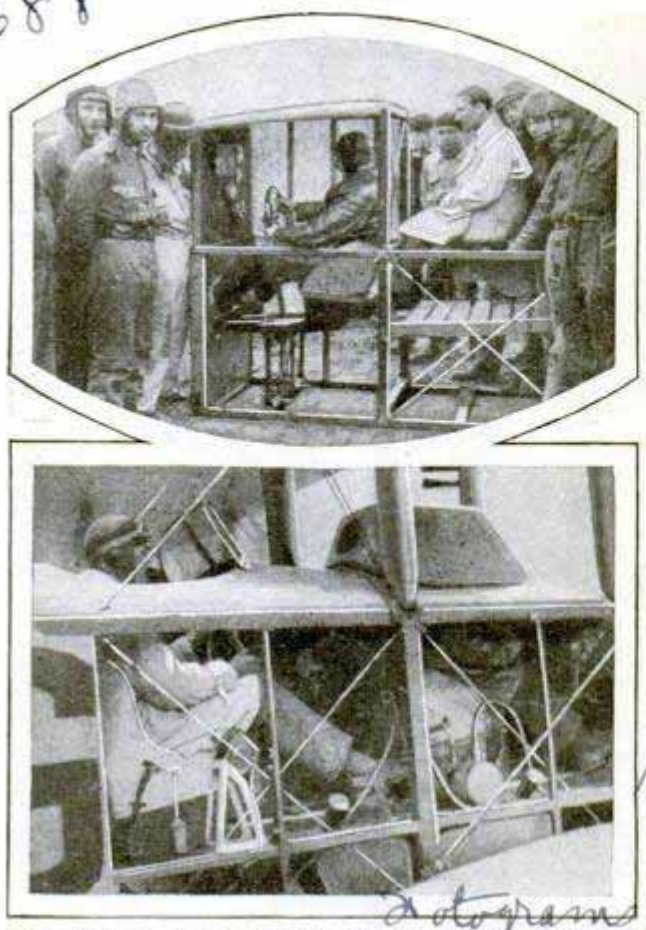
Assembled as Single Table; Center Units and the Separate Tables in Place

EXTENSION-TABLE SET SAVES SPACE IN SMALL ROOMS

Planned especially for the small apartment, a combination table arrangement saves space and meets a wide variety of requirements. It consists of two small console tables, a card table and a window bench. The two consoles may be assembled as a single round table or converted into a dining table by placing the card table between them. This is made still longer by adding the bench as an extra leaf. The combinations are quickly made.

NOISELESS BUILDING AGE SEEN THROUGH WELDING PROCESS

Electric arc welding as a substitute for riveting was used successfully in the erection of a large steel building in Philadelphia. The process is noiseless and saved about 100 tons of rivets and plates that would have been needed by the old method.



Two Views of the Dual-Control Airplane; Note the Open Pit for Clear-Weather Flying

RIGS PLANE FOR BLIND FLYING TO REDUCE NIGHT HAZARD

So that it can be more easily and safely guided at night and at other times when no landmarks are visible, a plane equipped by M. Farman, pioneer French aviator, has a dual control. A feature of the installation is that one pilot is entirely inclosed so that he must rely wholly on his turn-and-bank indicators, compass and other aids to direct him. This is considered a safer plan than the usual way, for in many instances, an aviator, trusting to his senses, has become confused in fogs and in darkness, whereas, had he trusted to his instruments, he would have been better able to avoid mishap. The second pilot is in the open cockpit so he can take over the controls for clear-weather flying.

OLD BEER-STORAGE CELLARS NOW PRODUCE MUSHROOMS

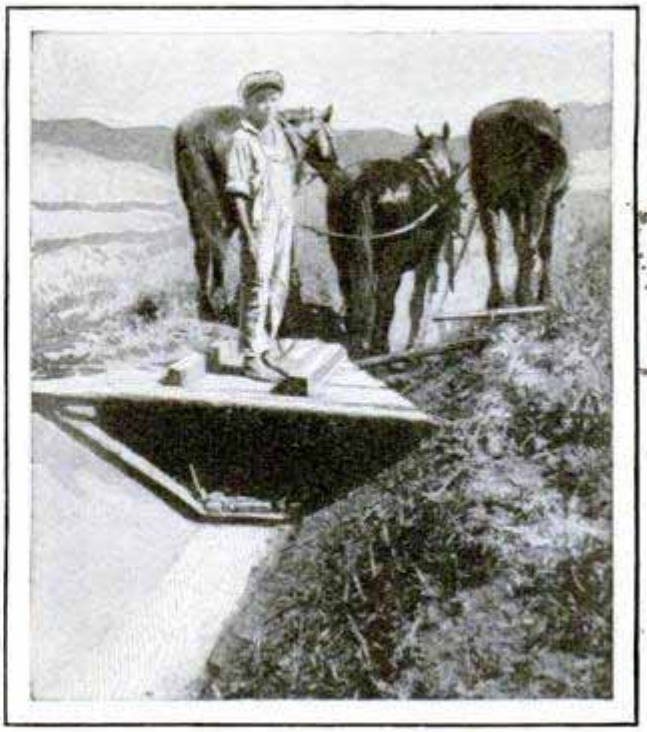
Mushroom production has increased in some parts of the country since prohibition, according to a Texas man. He points out that space formerly used for the storage of beer in various large refrigerating plants, is now being devoted to the cultivation of mushrooms. The areas are well suited to the work as there is abundant shade and the temperature is accurately controlled by the cooling coils.

MICROPHONE AIDS TEACHERS AS WELL AS PUPILS

Sitting at her desk, a teacher in a New Orleans school can speak to the entire student body or make announcements to other teachers in their rooms. This is accomplished by the "public address" system which utilizes the microphone and amplifiers in broadcasting the voice through loud speakers. The plan saved the construction of an auditorium large enough for the 510 pupils, as all of them can hear announcements, speeches and programs in their own rooms.

PLOW FOR FLAT-BOTTOM DITCH MAKES SLOPING SIDES

Forming ditches for irrigating, and other purposes, is simplified by a plow that scoops out a flat-bottomed channel with sloping sides. The depth and width of the ditch are determined by the position of the weight on the platform across the body of the plow. The blades that do the cutting are of steel and are set at an angle for efficient operation.



Scooping Out Ditch with the Digger That Leaves a Flat Bottom and Gentle Sloping Sides

Keenan R. Ward 669
151 Carhart St.
Marion, O.

MUSCLE and HOW to USE IT

The Right Way to Lift a Trunk, Putting the Strain on the Knees Instead of on the Back

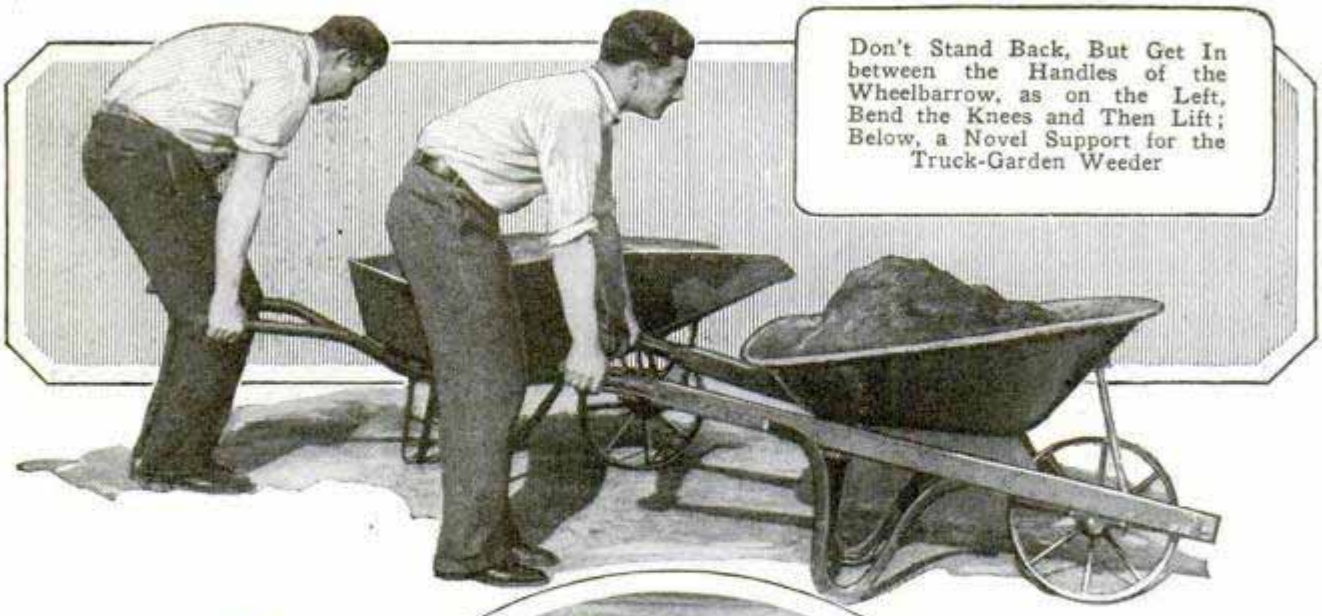
BIG BILL is a trunk heaver. So is Little Bill. Big Bill is always tired. Little Bill always has a reserve measure of energy left over at the close of the working day. The explanation of the difference is simple: Little Bill uses his muscles correctly. Big Bill doesn't.

Of course the average man isn't a trunk heaver. Nevertheless, he is called upon occasionally to lift a trunk, run a wheelbarrow, carry out the ashes, and perform other tasks calling for physical exertion. Whether the labor culminates in a "broken back" or merely a natural state of fatigue is largely dependent upon the use of the laws of leverage.

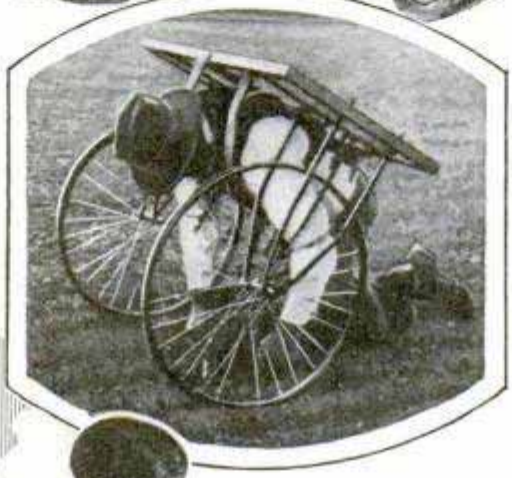
You cannot stoop and expect your arm muscles, assisted by the back, to lift heavy weights. The weight at the end of the arms is at the end of a long lever with a fulcrum at the hips, and the mechanical disadvantage is terrific.

To pick up a weight, you should squat with the back kept straight, grasp the object and then straighten up. The whole work is done with the legs; and the leg muscles are designed for the work. The strongest muscles in the body are the thighs. Next in order come the shoulders. It is on these two sets of muscles that the brunt of weight-lifting and hard physical labor should always fall, not on the abdominal muscles and the slighter, weaker muscles in the pelvic region.

Here Is the Wrong and the Right Way to Lift the Clothes Basket; Any Weight Is Easier Lifted If You First Bend and Then Straighten Up



Don't Stand Back, But Get In between the Handles of the Wheelbarrow, as on the Left, Bend the Knees and Then Lift; Below, a Novel Support for the Truck-Garden Weeder



correct position in lifting a weight; the strain is improperly placed. The other shows the correct procedure; the legs are bent, the weight is close in, the back is straight. The lift, therefore, is done entirely with the heavy leg muscles.

That's the first rule to follow in weight-lifting: Always use the leg muscles.

The second rule is: Get as close to the object as possible. A generation back, the "Georgia Magnet" amazed thousands of people by using this principle. Even the strongest man found it impossible to lift her body because she so cleverly contrived to keep him always at arm's length.

So, in picking up a wheelbarrow, for example, do not stand at some distance from the ends of the handles, but get your body close in so that the leg muscles can lift directly upward without the disadvantage of a diagonal cross strain.

Another important factor in weight-lifting is balance. The Chinese coolie, who carries weights by balancing them on the end of a long pole, has the right idea. In everyday usage, the man who carries two bags of twenty pounds each has very little more to carry than the man with but one twenty-pound bag. The reason is—balance. Moreover, when the weight is balanced in this manner you are

It Is Practically as Easy to Carry Two Twenty-Pound Bags as It Is to Carry One, Because the Man with Approximately Equal Weights in Both Hands Is Balanced; the Chinese Coolie's Carrying Pole and the Dutch Milkmaid's Shoulder Yoke, from Which Two Buckets Are Suspended, Are Both of Them Based on This Principle

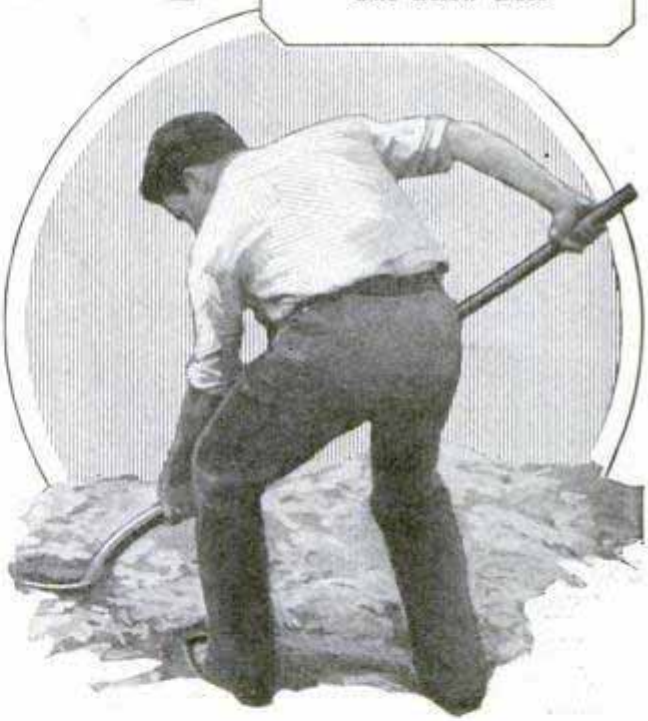
The pictures at the bottom of page 219 illustrate the point. The first shows the in-

Carry Heavy Weights across the Shoulder, Not in Front of the Body, and Shovel, as the Man in the Center and the One Below Does

far less liable to strain and posture defects than when the burden is carried almost entirely by the muscles on one side of the body.

Get the weight on top of your body whenever possible. It is not a good rule for wrestlers, but it saves backaches to the weight-lifter. A sack of flour, a small box, a heavy plank and other such articles should always be carried across the shoulder, and not in front of the body, hanging down from the partially contracted arms. In lifting a trunk, the weight should be rested on the knees, and the heavy thigh muscles called into play.

Always use the thigh muscles. It sounds simple enough, yet there are people who never give their legs a chance to prove their worth. Few people even know how to get out of a chair. The wrong way is to put the feet far in advance of the body weight. The comparatively small-muscled arms are compelled to do that which should properly be consigned to the heavy leg muscles. When you get out of a chair, do it with the feet almost directly under the body; it needs but a slight forward movement of the trunk and a gentle straightening of the legs to bring the body to an upright position.



A day of sand shoveling teaches the inexpert many things. One of these is the law of leverage. It is far easier to lift a long-handled shovel than a short one. For that reason you should use a maximum stretch of the arms in shoveling with a long-handled shovel, and not merely content yourself with a short grip. Also, do not bend over to an unnecessary degree. Use your leg muscles.

The right way is to squat slightly as you bend over. Use your left knee to sink the shovel into the sand bed—an important contrast from the more tiresome "arm shoveling."

The Leg Muscles, Constantly Exercised by Walking, Are Also Made for Lifting, and Save Back Sprains

All small matters. Nevertheless, they explain why Big Bill always has the backache, while Little Bill needs only a shower to perk him up. Little Bill knows: That his legs were made for lifting; that a weight should be carried on top of his body whenever possible; that a balanced weight is an easy weight; that the closer the weight the lighter the weight.

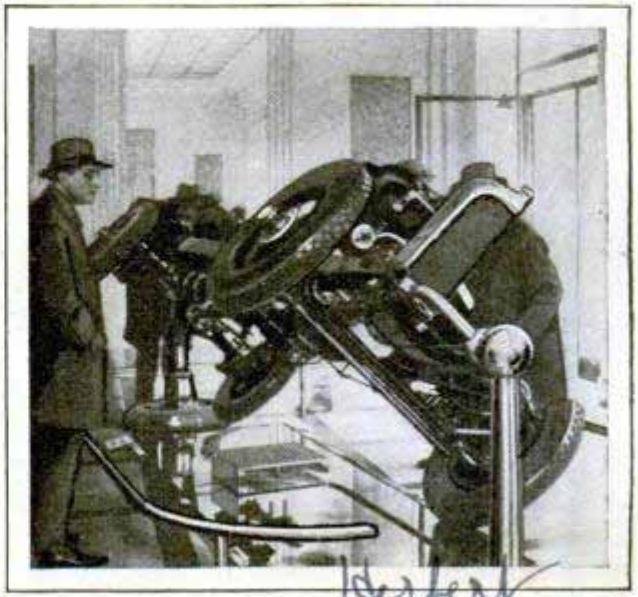
Big Bill is always tired. Big Bill doesn't know these things.

MYSTERIES OF STARS' ORIGIN INCREASE WITH TIME

845 Astronomers are less positive about stellar evolution now than they were twenty-five years ago, according to Prof. Edwin B. Frost, director of the Yerkes observatory of the University of Chicago, at Lake Geneva, Wis. The nebulae from which the stars were supposed to have originated are now thought to be mere borrowers of light, shining in the illumination from stars near by. Another theory that has been abandoned is that the stars must have started from a state of rest. Observations show that they are all in motion and there is no reason to believe that they were still at any time. Better telescopes and the development of the camera have expanded the scientists' conception of the size of the universe some 10,000 times, within the last thirty years, Prof. Frost declares. Holding a dime at arm's length against the milky way, obscures some 15,000,000 suns, astronomers estimate, while between 300,000 and 400,000 stellar images may be revealed on a single photograph, although it covers less than one-thousandth part of the sky. A star like Antares gives the scientist some idea of the tremendous proportions of the heavens. By accurate measurements, astronomers have discovered that this body has a bulk 40,000,000 times that of the sun.

UNSEEN SALESMAN HELPS 784 AUTO BUYERS

Persons interested in the automobiles sold by a Paris merchant are not annoyed by the presence of a talkative salesman while examining the cars. They hear selling talk, but it is given by an attendant who sits, unobserved, at a desk some distance away and describes the good points of the car through a microphone and loud speaker. The auto is stripped to show its internal parts and turns on a pivot, over a mirror, while visitors inspect it.



Demonstrating Auto on Its Rack, with Mirror Below; Salesman Talks through a Loud Speaker

Christian Science Monitor 5/29/29

AIR-MAIL MILEAGE SIX MILLION ANNUALLY

United States air-mail planes flew 5,870,480 miles in 1927, according to figures just compiled by the department of commerce, and in that period they carried 1,654,165 pounds of mail and 2,263,480 pounds of express, not to mention 8,679 passengers. The air mail alone brought the carriers an income of $2,643,454. The enormous amount of aerial express shown by the figures was due to the Ford line from Detroit to Chicago, carrying automobile parts to the assembly plant in the latter city. This one line handled 2,217,621 pounds of express. On May 15 of this year, there were 11,067 miles of airways in daily operation, and the regular plane schedules called for the flying of 26,737 miles daily—greater than the distance around the earth at the equator. In addition to the regular airways operations in 1927, nine transport operators flew 36,918 passengers a total distance of 500,000 miles. Statistics have been compiled covering the air-mail lines, showing that from 1918 to the end of June, 1927, the postal planes flew 15,657,530 miles, carried 298,517,760 letters and completed ninety-three per cent of scheduled trips.

The "Berengaria" as a Motion-Picture Studio; Filming a Night Scene with the Aid of 4,000,000 Candlepower Lights

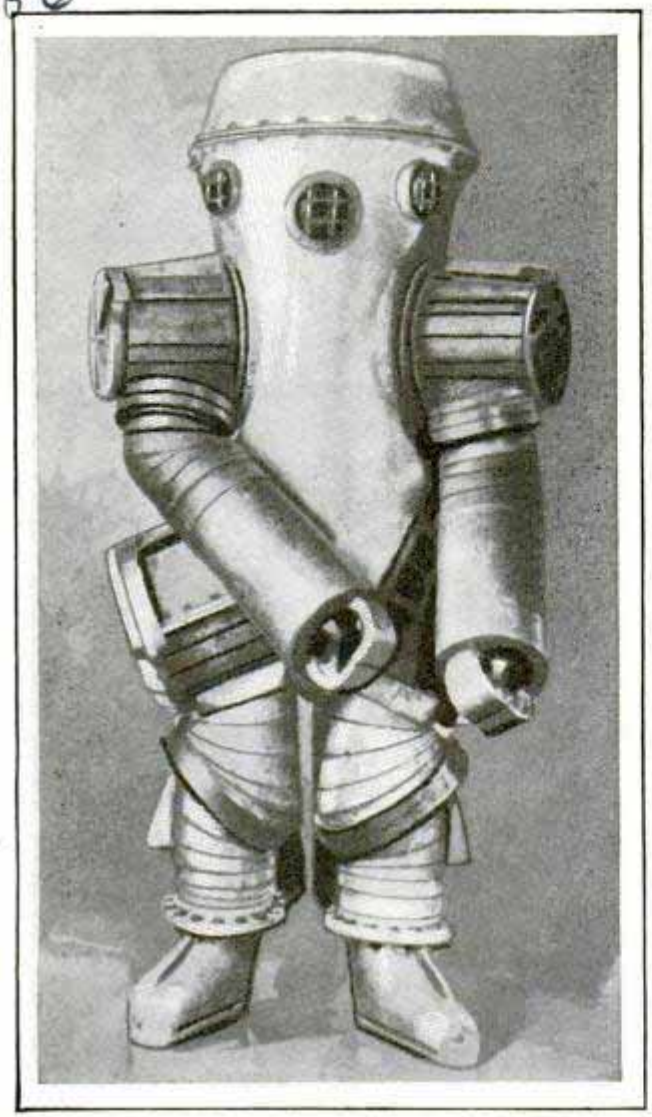
HUGE LINER AS MOVIE STUDIO AFFORDS REALISTIC SCENES

In taking scenes for a British motion picture, the "Berengaria" was temporarily converted into a studio. Current for the electric lights needed for night effects was obtained from the ship's own lighting system, nearly 4,000,000 candlepower being used. One of the most interesting views was of a rescue at night, featuring the lowering of a lifeboat from the davits, while the lights were played along the side of the steamer. Cameras and lamps were stationed on special rafts floated near by.

ELECTRIC COOLER IN TRUCK HELPS MOTOR SHIPPING

Transportation by motor truck will be made more effective, it is believed, by the introduction of an electric refrigerating unit in the carrier for shipping perishable articles. Butter, eggs and meat are now being handled by an auto-truck line in the west with the help of this equipment.

¶Write our Bureau of Information if you wish to know who makes or sells any article described in this magazine.



Heavy Diving Suit Designed for Work at Depths of 200 Feet and for Forty-Five-Minute Periods

QUEER DIVING SUIT TO REACH GREATER DEPTHS

Divers will be able to descend to a depth of 200 feet and work for forty-five minutes and more, in a metal suit recently devised, its inventor hopes. It weighs 1,400 pounds, is equipped with powerful lights and its steel body has overlapping units of aluminum, somewhat like the scales of a fish. The air hose will be contained in a steel-protected sheath.

MAKING GLASS EYES REVEALS BLOWERS' HIGHEST SKILL

Since 500 B. C., when they were made of earthenware and pebbles, the art of fashioning artificial eyes has been developed to a high degree. Today, they are made by expert glass blowers who use no brushes and no tools other than their blowing tubes. A first step is to form a bubble of opal glass the size of the eyeball desired. The iris is put on next by heating and fusing minute streams of blue, brown and other glass until the exact shade is obtained. Some of the color rods have to be heated and drawn out to a fine thread. Flint soda glass is employed, as it is hard and does not irritate the eye socket. When the iris is done, the pupil is added and then the lens, a coating of crystal glass applied in a molten state. For the veins, threads of glass so small as to be almost invisible are added. The back is shaped so that the muscles will grip the eye. Cooling in a sand bath is the last step. Artificial eyes have been made for birds and dogs. A Chow dog, entered in a contest, had a glass eye that was so nearly perfect it escaped the notice of the judges who gave the dog a mark of 100 per cent on its eyes.

ICELESS COOLER KEEPS MILK AND FOODS FRESH

Designed especially to prevent the bottle from spoiling when left on the doorstep, a cooler, adaptable also to other products, has been introduced. It consists chiefly of a cone-shaped frame covered with cloth, which is kept moist by water supplied from a jar at the top. The cooler is placed over the bottle in a drip pan partly filled with water, to shut off outside air. The cooling is accomplished largely by evaporation of the water as it soaks down into the cloth. One filling of the jar is said to be sufficient for twenty-four hours or more. The cloth is easily removed for the purpose of cleaning.

FIRST AID FOR GOLDFISH

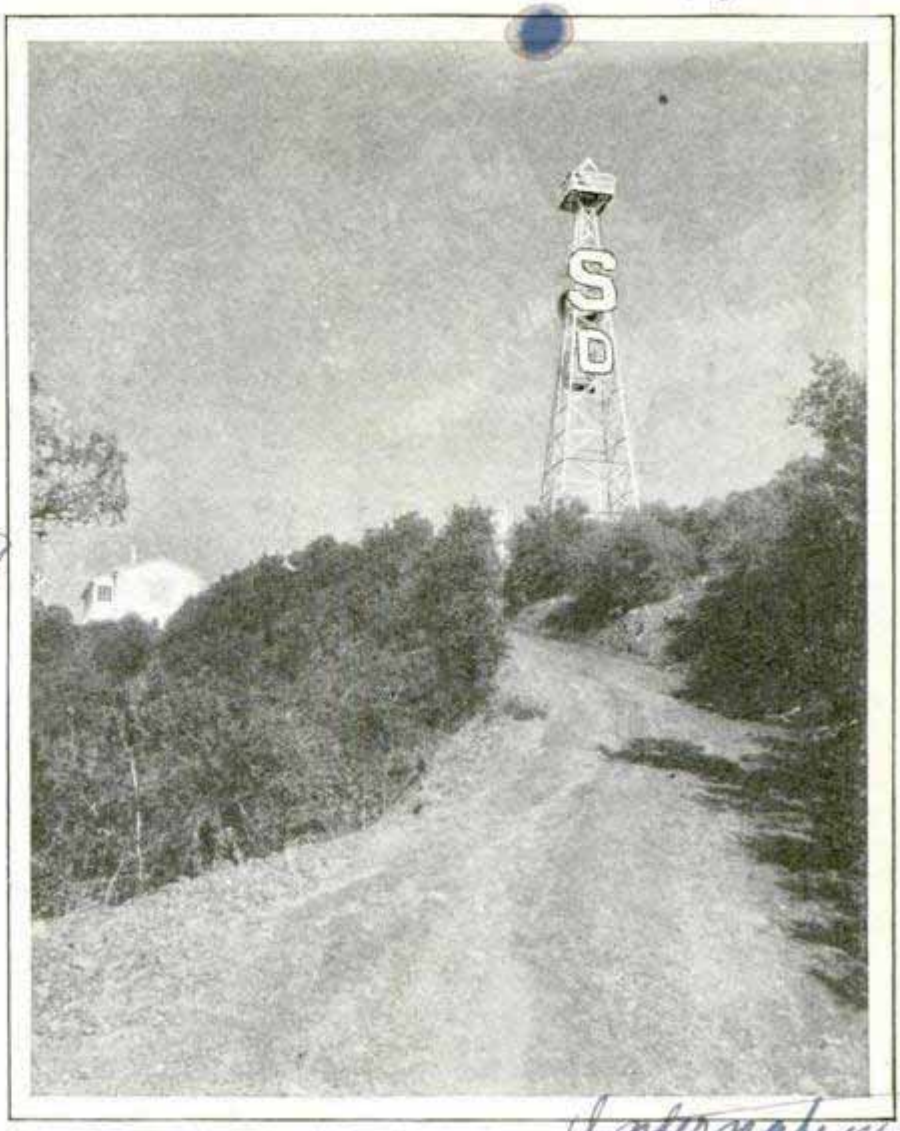
Artificial respiration, similar to that used in reviving human victims, was applied in saving the life of a goldfish not long ago. A woman discovered her pet lying on the

floor, apparently dead. She held it under water with one hand, grasping it with the other just back of the gills, and applied intermittent pressure. In a few moments, the fish showed signs of life and, at the end of twenty minutes, it was swimming about in a normal manner.

SAND LOADER DEVELOPED FROM TOY

Toys modeled after full-size machinery are not new, but the development of a practical machine designed from a toy is an unusual procedure. A California inventor who has produced a small toy sand loader to add to the joys of children's play, is preparing to market two sizes of large machines for commercial use. The toy loader, which scoops up sand and empties it into a toy motor truck, has a ten-inch disk wheel, fitted with scoop buckets to dig the sand and elevate it into the truck. It weighs but seven pounds, and comes in a convenient carrying case. The large machines will have conveyor belts for distant delivery of the sand.

Toy Sand Loader Which Served as Model for a Commercial Unit; It Operates like the Larger Loaders



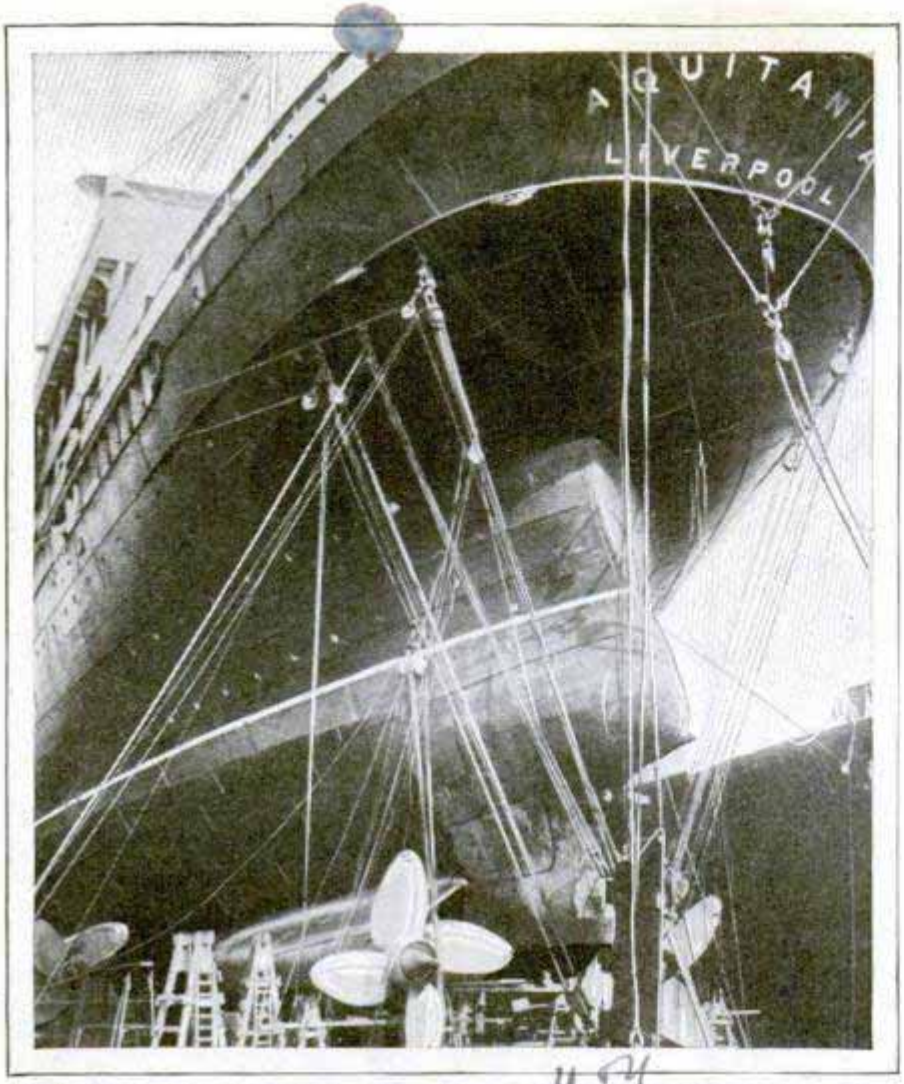
Powerful Airplane Beacon and Tower with Identifying Letters; the Light Can Be Seen for More than 100 Miles

BIG AIRPLANE BEACON ON HILL VISIBLE HUNDRED MILES

Two powerful beacons have been erected recently in California to help guide airplanes. One is near San Francisco, the other on a hill not far from Los Angeles, and each is visible at a distance of 100 to 150 miles. Lamps of 10,000,000 candlepower are installed at the top.

MIND WORKS BEST AT NIGHT STUDENT TESTS SHOW

In the morning, after a night's rest, the mind is well prepared for brief spurts of activity but is too restless for long concentration, experiments have shown. Mental tests on a number of students recently, proved that the subjects achieved a ten-per-cent higher score at night. As the day wears on, the brain appears to become better adapted to concentration.



The "Aquitania" in Drydock during Change of Rudder, Which Is Seen Connected to Tackle on Ship's Sides

RUDDER AS HIGH AS A HOUSE GUIDES BIG SHIP

The "Aquitania" was without a rudder for a short time recently, but no harm was done, as the vessel was in drydock undergoing repairs. Although the rudder alone is a huge unit, it seems tiny in comparison with the vast bulk of the ship, which is nearly 869 feet long. Its engines develop 60,000 horsepower.

NOISE CAUSES MILLIONS LOSS IN DECREASED EFFICIENCY

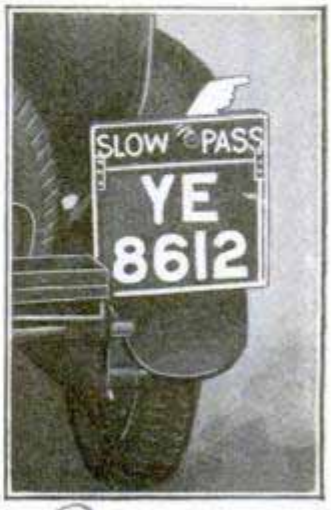
According to the estimates of a British expert, noise causes a loss of more than $5,000,000 weekly in England alone. He bases his assertion on the contention that disturbing sounds of various kinds result in impaired efficiency among workers of many classes, loss of sleep and sometimes illness. Many persons become accustomed to certain noises, but it is said that, although they do not appear conscious of them, the sounds have a detrimental effect upon their nerves. Tests have been conducted with office workers and others to show that they perform their tasks more efficiently in rooms relatively quiet than where there is disturbing noise.

A BIRD'S EYE SECRET

Birds have exceptionally keen eyesight and the additional faculty of seeing an approaching person while apparently intent on feeding. Small birds will instantly discover a hawk, although it is so high as to be merely a speck to the human vision. The mystery is explained by the fact that the bird's eyes do not co-operate but each can focus on a different object at the same time. While one is intent on searching the ground or other close area for food, the other may be adjusted for distant vision.

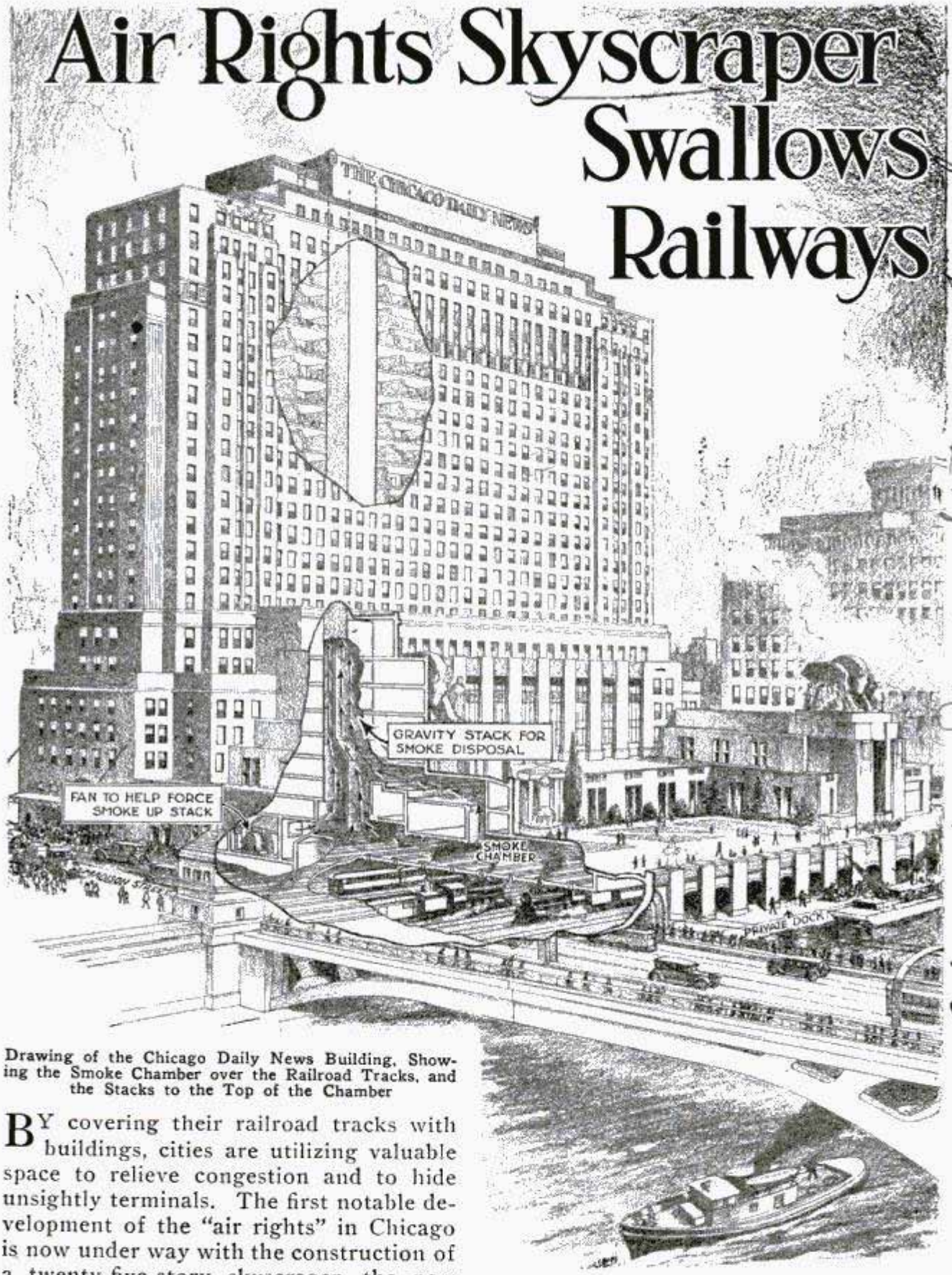
HAND ON REAR AUTO SIGNAL PROMOTES SAFETY

So that drivers behind may clearly see what course the car ahead is to take, a rear auto signal recently put on the market flashes the words "Slow" or "Pass" and a small white hand, visible from a distance, points in the direction that the machine is to go. This is operated by a special switch, while the words are automatically illuminated.



© P. & A.

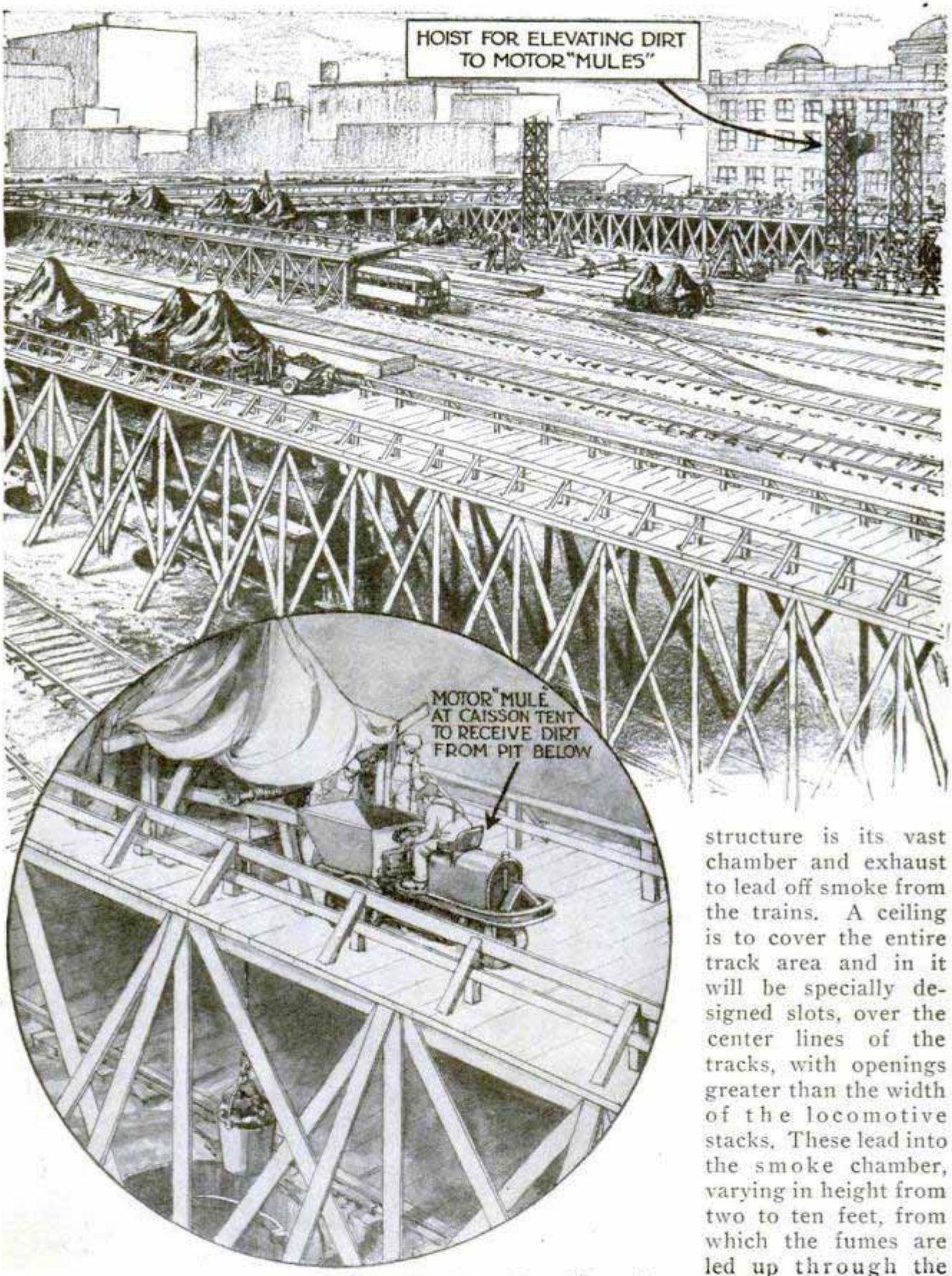
Air Rights Skyscraper Swallows Railways



Drawing of the Chicago Daily News Building, Showing the Smoke Chamber over the Railroad Tracks, and the Stacks to the Top of the Chamber

BY covering their railroad tracks with buildings, cities are utilizing valuable space to relieve congestion and to hide unsightly terminals. The first notable development of the "air rights" in Chicago is now under way with the construction of a twenty-five-story skyscraper, the new home of the Chicago Daily News.

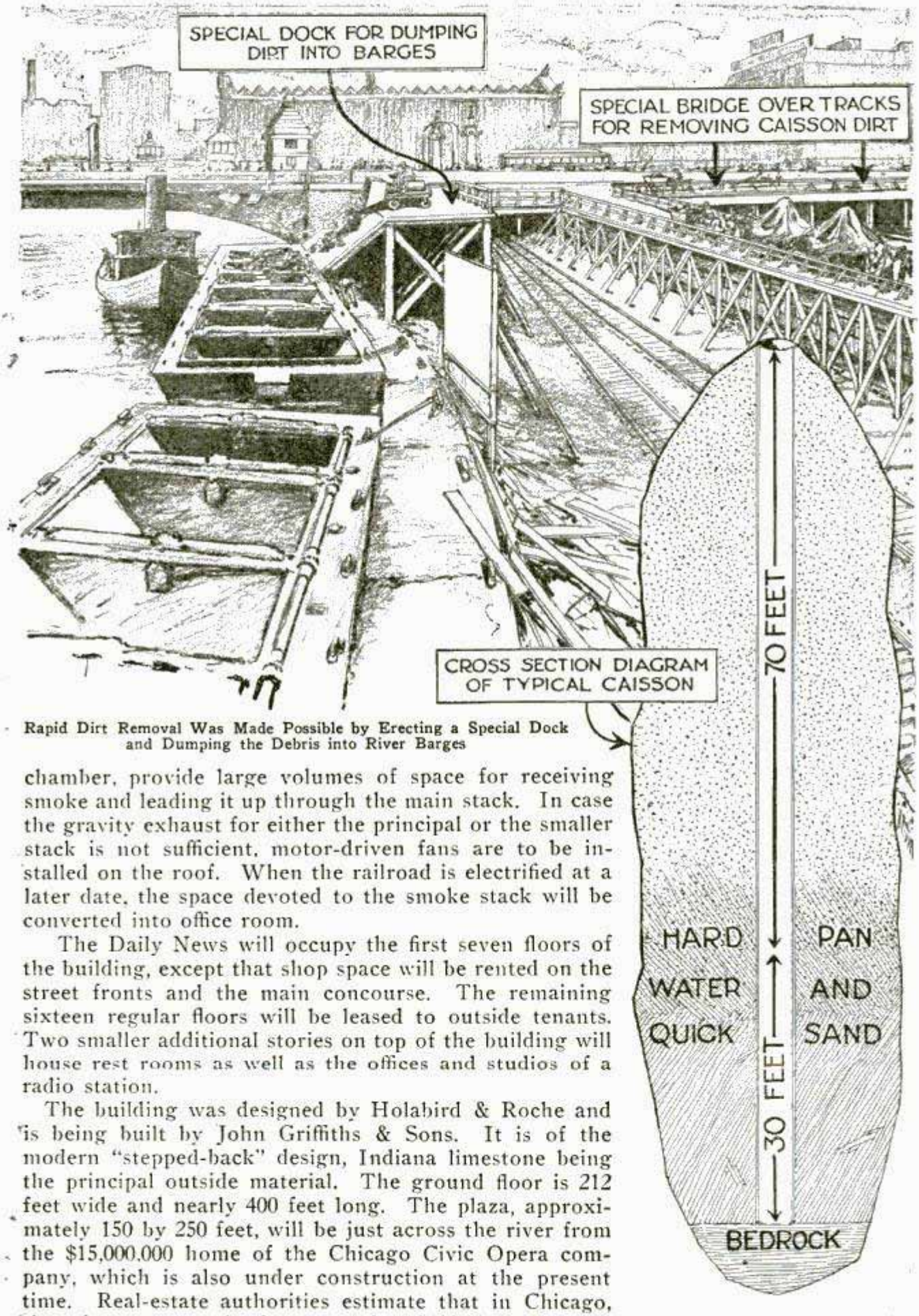
Interesting engineering problems were solved in this project. In the first place, 100 caissons were sunk 100 feet to bed rock to support the main structure, and fifty-nine were dug to hardpan as foundation for the plaza, an unusual and beautiful feature of the building. All of them, comprising more than two and one-half miles of boring, were made without interrupting train service, although they are scattered among the network of tracks. This



Trains Were Not Interrupted while the Building Was Erected above Them; Note the Caisson in the Inset, Close to the Track

was done by erecting scaffolds and platforms for the dirt-bucket elevators, so that trains could run underneath.

The second unusual feature of the structure is its vast chamber and exhaust to lead off smoke from the trains. A ceiling is to cover the entire track area and in it will be specially designed slots, over the center lines of the tracks, with openings greater than the width of the locomotive stacks. These lead into the smoke chamber, varying in height from two to ten feet, from which the fumes are led up through the stacks to the top of the building. In the main stack, containing 220 square feet of area and extending 335 feet above the tracks, the smoke is conducted by gravity. Domes, or extra-high places in the smoke



Rapid Dirt Removal Was Made Possible by Erecting a Special Dock and Dumping the Debris into River Barges

chamber, provide large volumes of space for receiving smoke and leading it up through the main stack. In case the gravity exhaust for either the principal or the smaller stack is not sufficient, motor-driven fans are to be installed on the roof. When the railroad is electrified at a later date, the space devoted to the smoke stack will be converted into office room.

The Daily News will occupy the first seven floors of the building, except that shop space will be rented on the street fronts and the main concourse. The remaining sixteen regular floors will be leased to outside tenants. Two smaller additional stories on top of the building will house rest rooms as well as the offices and studios of a radio station.

The building was designed by Holabird & Roche and is being built by John Griffiths & Sons. It is of the modern "stepped-back" design, Indiana limestone being the principal outside material. The ground floor is 212 feet wide and nearly 400 feet long. The plaza, approximately 150 by 250 feet, will be just across the river from the $15,000,000 home of the Chicago Civic Opera company, which is also under construction at the present time. Real-estate authorities estimate that in Chicago, there is property valued at more than $400,000,000 which might be developed by utilizing the air rights over the tracks, as has been done in the Daily News building.

It Does the Work of Several Clerks, the Coin-in-the-Slot Stamp Dispenser, in New York Post Office

COIN-IN-SLOT STAMP DISPENSER FOR POST OFFICE

Distributing stamps from a coin-in-the-slot machine is not a new idea, but the method has been amplified in a dispenser installed in the New York post office. It delivers several denominations of stamps besides books of them, stamped envelopes and postal cards. No extra charge is made for the service, the customer getting the full equivalent for his money just as he would at the regular stamp window.

FEVER FROM LOW-WAVE RADIO TO HELP TREAT DISEASE

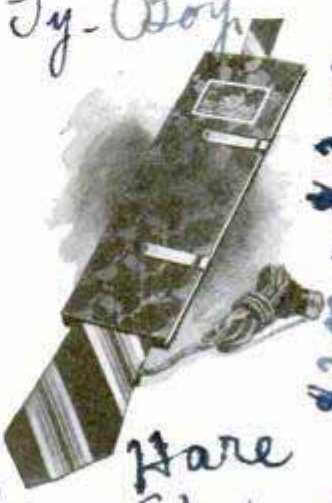
That radio may be used indirectly in treating disease, is the possibility suggested by recent investigations into the effect of waves of low frequency upon the human system. It had been noticed that men working about a six-meter set in an eastern laboratory frequently fainted, or became ill. A fever was present in almost all cases of this kind, and experiments showed that it was induced by the action of the waves. In treating some diseases, fever is induced to kill germs that will not live at high temperatures, so it is thought that radio waves may be used for this purpose.

PROBING THE TOMB OF FIRST ARTIST OF ALL HISTORY

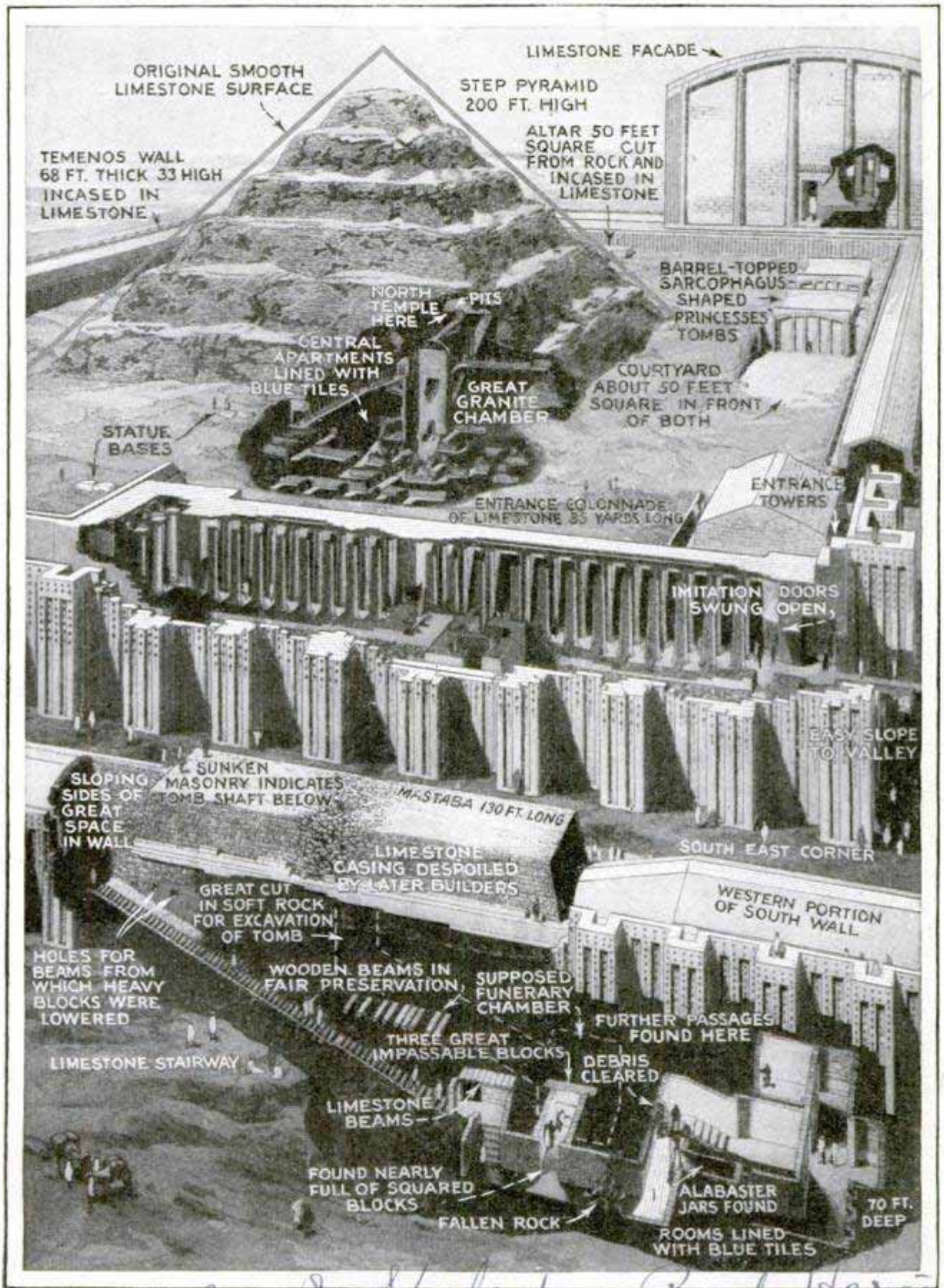
The tomb of Imhotep, the first great Egyptian architect and the first artist in recorded history, is believed to have been located by excavators who are probing the famous "Step Pyramid" of Saqqara, known as the oldest stone building in the world. The pyramid was built about 3000 B. C. by Imhotep for Zoser, famous pharaoh of the Third Dynasty. The excavations have already disclosed that the name Step Pyramid, given it because it rises in a series of terraces, is a misnomer, for the original pyramid was smoothly faced with limestone blocks, but later pharaohs had their workmen steal the ready-cut blocks to face their own pyramids, leaving the denuded base. The excavators have uncovered a series of princesses tombs, with delicately fluted columns, long series of underground passages and rooms, many lined with blue tile, and believe they have located the entrance to the burial chamber of the architect. They found a robbers' shaft, where tomb looters had reached some of the chambers seventy feet underground, but the discovery of a limestone stairway, leading down through a long sloping cut in soft rock, indicates the robbers never reached the real burial chambers far underground.

ELECTRIC PRESS FOR NECKTIES HELPS PRESERVE FABRIC

Neckties are kept in good condition at all times with the aid of a small electric presser which is suitable for home use. The tie is moistened slightly and then placed between the two sides of the unit, which apply pressure and heat from a lighting socket. A metal tongue, inserted in the tie, keeps the seam and lining from showing through on the face and helps hold the fabric for pressing.



WORLD'S OLDEST STONE BUILDING YIELDS SECRET



© S. W. Clatworthy

The "Step Pyramid," Above, with Lines Showing How It Appeared When the Original Smooth Limestone Facing Was in Place, and, Below, Diagrams of Some of the Underground Chambers Which May Lead to a **Burial Chamber Far Older than King Tut-ankh-Amen's**

For Service in Rough Country; the Three-Wheeled Motorcycle Tested by Military Experts in England

THREE-WHEELED MOTORCYCLE TRAVELS ROUGH GROUND

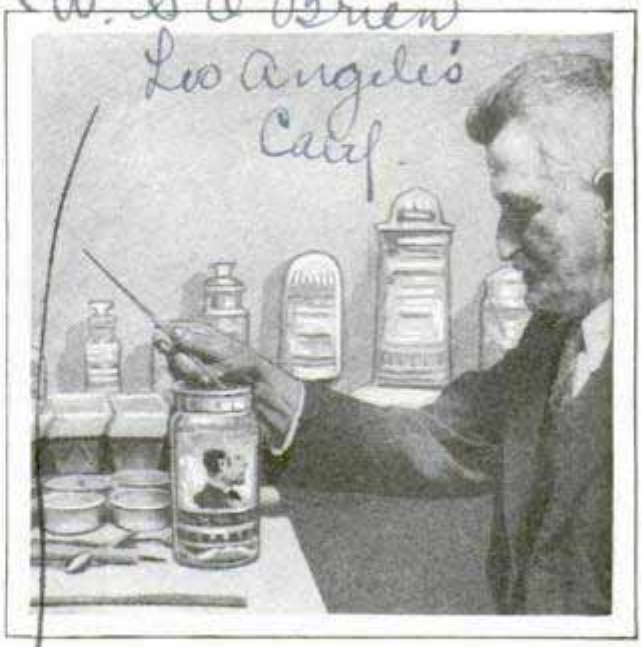
Designed for cross-country service, a three-wheeled motorcycle has been tested in England. There are two small wheels in the rear and the machine has a duplex steering arrangement. The cycle has been proposed especially for military uses.

BIG GLASS TESTED AT NIGHT TO REVEAL DEFECTS

Light, and plenty of it, is usually required in searching for visible flaws in any object, but the seventy-inch disk of optical glass recently made at the bureau of standards for the Perkins observatory at Ohio Wesleyan University, was subjected to its most exacting tests in darkness. The reason was that the internal condition of the big piece of glass is revealed by passing beams of light through it and then studying the patterns and colors that result. This can be done satisfactorily only in a dark place. There was no room large enough at the bureau, so the tests were performed at night. At least 100 feet of unobstructed vision was necessary in making the proper observations. The examination revealed that the distribution of internal strain in the piece was remarkably uniform, and that the degree of strain, per unit of thickness, was less than is frequently found in small lenses and prisms used in optical instruments of the highest precision. The glass is eleven inches thick and weighs 3,500 pounds. It was baked for eight months under graduated temperatures in a specially constructed furnace. Four previous attempts to obtain a disk of this size had been unsuccessful.

PICTURES "PAINTED" WITH SAND INSIDE OF BOTTLES

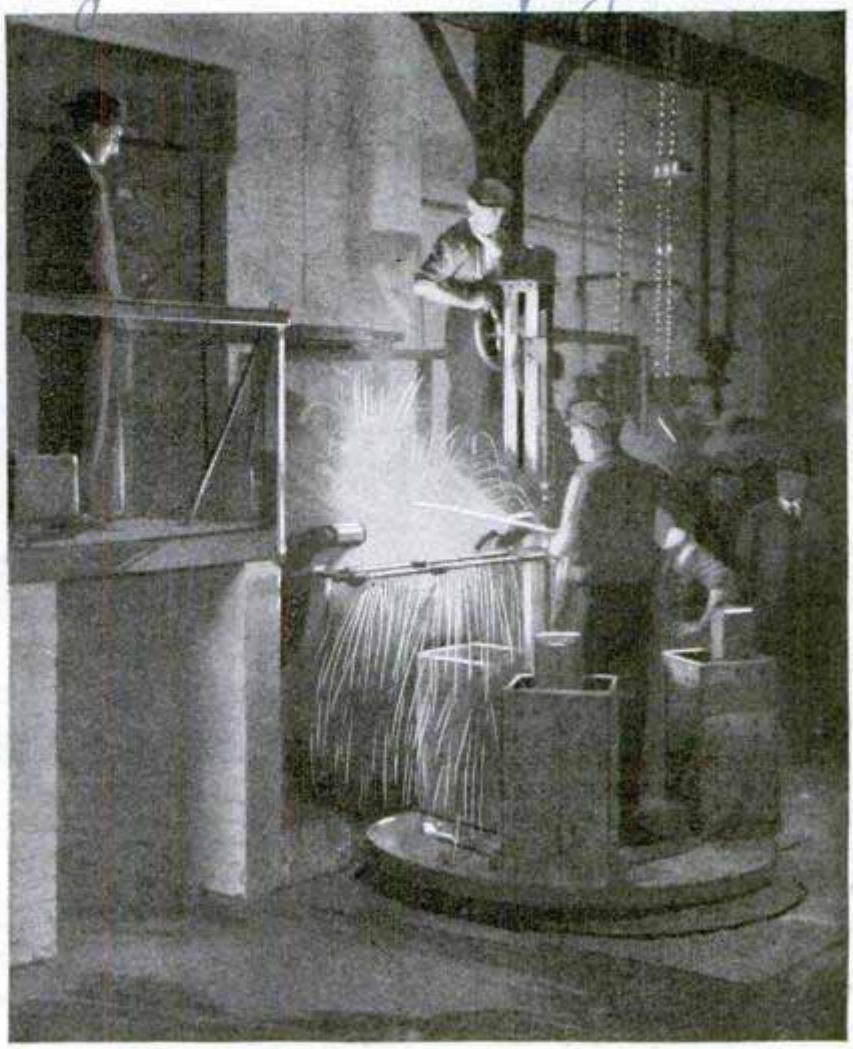
Forming pictures and designs of colored sands on the interiors of bottles, is the interesting art hobby of a California man who got the idea from a natural group of "painted rocks." The grains are carefully arranged with special instruments to achieve the effect and the bottles are packed full and sealed so that the sand will not become loose and spoil the pattern. Fifty-six shades, all of natural colors and of samples sent to the artist from different parts of the world, are employed in making the designs.



Completing a Sand Design on the Interior of a Glass Bottle; the Grains Are of Many Different Colors

CRUCIBLE STEEL IS MADE WITHOUT FURNACE

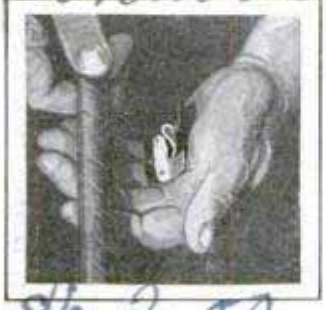
Steel is made by electric current, without the use of wires or a furnace, under a process recently developed. The material is melted inside a wooden box that remains quite cool to the touch. The method is adapted to the melting of crucible tool steel, which has been made in clay pots heated in a furnace and lifted out with long tongs. Under the new process, some 450 pounds of metal are put in a single crucible surrounded by an inch of sand to prevent the radiation of heat. Around the sand, is a coil, cooled by water, carrying a high-frequency alternating electric current. The whole is encompassed in a wooden casing so that the apparatus resembles a large packing box. By action of the current in the coil, although there is no direct connection with the crucible or its contents, heat is induced in the metal until it is melted and, at the same time, the steel is made to move violently so that a thorough mixing results.



Making Crucible Tool Steel in a Wooden Box, Which Contains the Crucible and the Electric Heating Element

GRIP GUIDE FOR GOLF PLAYERS HELPS IMPROVE GAME

Easily slipped on, a grip arrangement is said to teach the beginner how to hold his thumbs and fingers in the proper manner, to strengthen the left hand and insure control of the stroke, especially at the top of the swing. It automatically holds the club in the fingers and lifts the palm away from contact with the shaft at the same time. The guide is worn on the third and fourth fingers of the player's left hand and is held in place by adjustable straps. Once adjusted, there is no need to loosen the strap. It is slipped on and off like a glove. Left-handed players use it on the right hand, on the third and fourth fingers. It is used with all clubs.

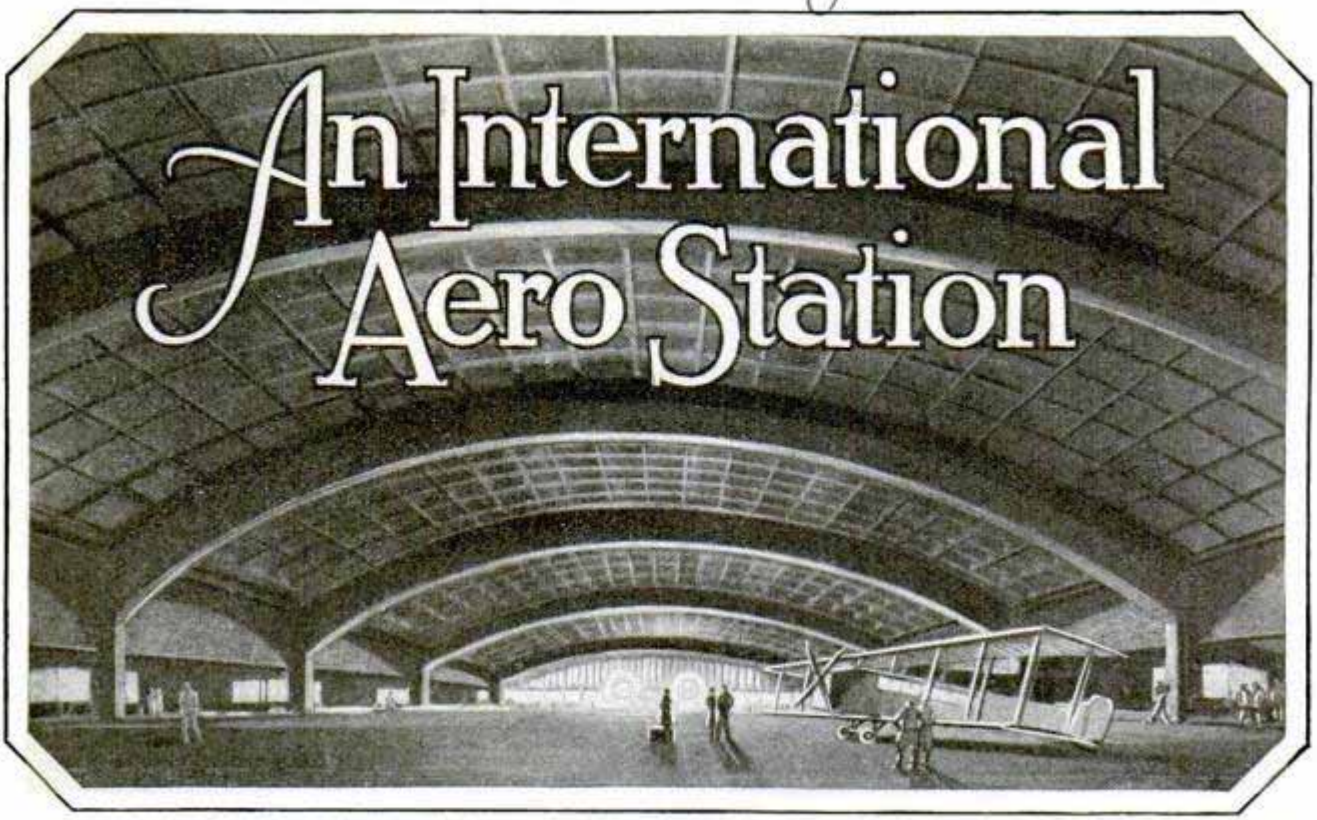


FABRIC FOR CEMENT ROAD SIMPLIFIES REPAIRS

Laid over the concrete base of a road, a fabric of loose cotton mesh affords cleavage between the foundation and the surface material. When the top layer must be repaired, it can be removed, and a new surface installed, without impairing the more permanent base below it.

621 Contr. Hamilton M. Wright
15 Park Row, New York

An International Aero Station



The "Train Shed" of the New Airport to Be Built at Pau, France; International Planes from All Europe Will Take Off and Land within the Giant Airdrome, Safe from Rain and Snow

French Plan Airport Modeled on Railroad-Terminal Lines, with Giant "Train Shed" for Air Passengers

A RADICALLY new idea in airports is to be realized at Pau, France, fifty miles from Bordeaux, as a result of competition for the best airdrome plans. The winner of the prize, Maurice Chauchon, who also has won a traveling scholarship in the United States to permit him to study American architecture, has taken the railroad-terminal idea and applied it to the needs of aerial travelers.

Under a glass-lighted "train shed" of heroic dimensions, the passengers of the European international air lines will embark and debark, sheltered from the weather and protected from the dust or mud of the usual landing field. The enormous landing room is to be 370 feet wide and 260 feet deep, furnishing plenty of room for three of the largest air liners at one time. The incoming planes, landing on the open field, will taxi directly into the shelter, and after unloading, will run out again and down the line to one of the row of hangars alongside of it.

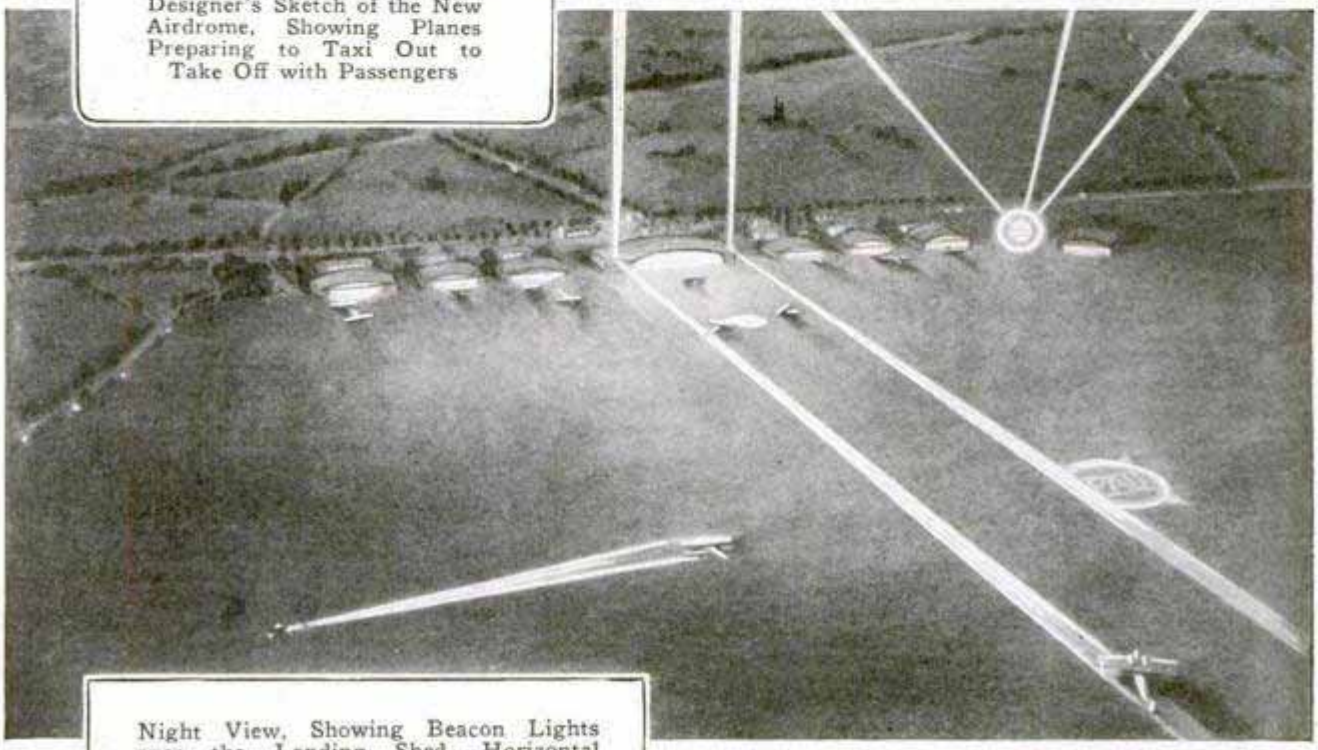
Two giant searchlights will be mounted at the front corners of the landing shed, one of each pair pointing directly upward at night as beacon lights, and the other leveled across the field, to furnish a stream of illumination for landing planes. The marking beacon of the field, throwing three vertical beams, will be at one side of the hangars, and the name, set in the ground, will be covered with heavy glass and electrically lighted by night.

In addition to the landing room and hangars for the planes, the plans include machine shops, storehouses for spare parts, a restaurant, hotel rooms, custom office, information bureau, ticket office, and even a booth where money can be exchanged for the currencies of any other country to be visited, so the traveler will reach his destination supplied with funds of the right kind.

Although only twenty-eight years old, the designer has won a number of other prize contests since his graduation from the famous Ecole des Beaux-Arts.

The American Institute of Architects established the French traveling scholarship, which has been awarded M. Chauchon, as "a valuable contribution to international architectural education and a graceful recognition of our educational debt to France."

Designer's Sketch of the New Airdrome, Showing Planes Preparing to Taxi Out to Take Off with Passengers



Night View, Showing Beacon Lights over the Landing Shed, Horizontal Flares, the Illuminated Airport Name and the Row of Hangars

An Aerial View by Day, as the Port Will Appear from an Approaching Passenger Liner; Note the Broad Runway

Steadying the Small Motion-Picture Camera with the Shoulder Strap and Supporting Rod

STRAP HOLDS MOVIE CAMERA FOR STEADY PICTURES

To keep the small motion-picture camera steady while in operation, a shoulder strap and supporting rod have been introduced. The rod is placed in a socket at the lower part of the strap loop, which is easily adjusted to fit the wearer. The arrangement makes it easy to focus the instrument, takes the weight from the hands and arms and eliminates most of the bothersome shaking in the finished reel.

AUTO CLOCK LIKE SPEEDOMETER WITHSTANDS SHOCKS

Resembling a speedometer, a clock for the automobile instrument board is said to keep accurate time in spite of the jolts and jars it receives, and has the further advantage of being more easily read than the usual dial. No hands are exposed, merely the numerals, the hours being displayed in an upper opening, while the minutes are registered in a window below.

THINKING MACHINE FOR STORE HELPS RECORD SALES

Constant record of merchandise, from the time it is unpacked until it is sold, is kept by means of an apparatus devised especially for department stores. It combines the functions of tabulating units, telephone selector devices and electrical transmitters and recorders. A chief purpose is to enable clerks and others in various parts of the store to transmit a quick and accurate record to the central office, where the data are conveniently arranged for auditing or other examination. Transmitters are distributed in the various departments of the store and connected with the recording units at the central office. By inserting a punched card into the transmitter, a record is made at the main desk of such factors as the selling price of the article, the salesman, cashier and the customer. The installation is said to save time, reduce trouble by eliminating the loss of bills and merchandise slips, and to afford a means for a quick check-up.

MINNOW NET COMES APART FOR EASY PACKING

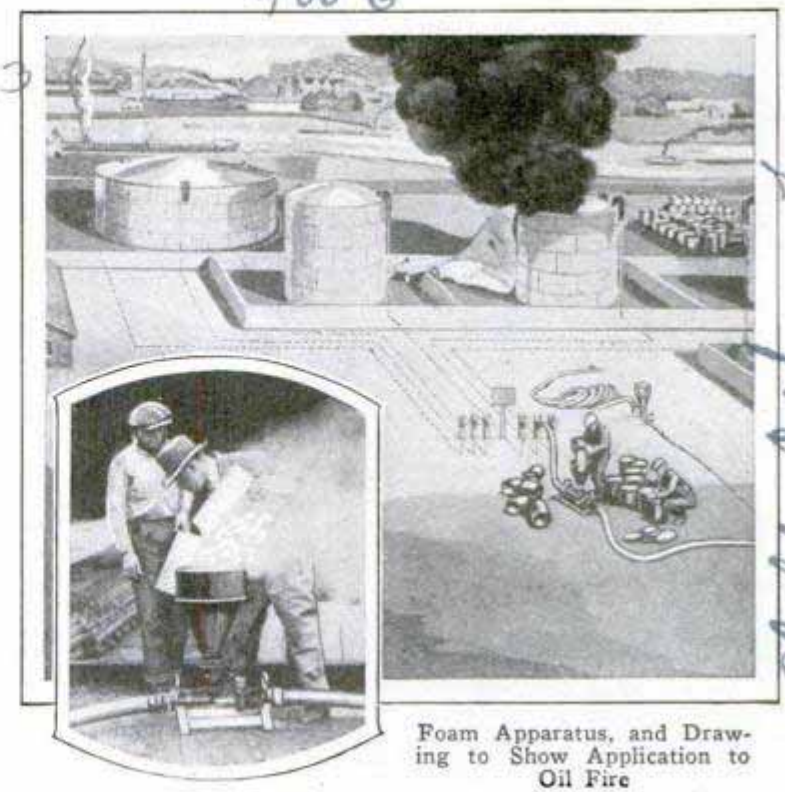
For greater convenience in carrying, a minnow dropnet is quickly taken apart when not in use. The hoops are made of steel and the net is shaped to insure a large catch. The outfit is light in weight and rolls up into a very compact bundle.

"ROBOT" TO GIVE ANAESTHETIC SAVES EXTRA ATTENDANT

A mechanical unit that administers anæsthetic has been developed by a University of Maryland professor. It does the work of an extra attendant and is also said to prevent an under or overdose, as it uses the exact amount to keep the patient unconscious. Its operation is governed partly by the subject's breathing.

POWER OF AUTOMOBILES EXCEEDS ALL OTHERS

If all the automobiles in the United States were linked to the stationary engines of all descriptions and sizes, locomotives and windmills, the motor cars would outpull the entire assembly, according to figures compiled by the department of the interior. In 1923, the horsepower of all generating equipment, exclusive of pleasure automobiles, was 230,514,000, while the total, including pleasure cars, was 684,044,000. In 1849, two-thirds of the total industrial power equipment was found on farms, but in 1926, the farms had only seventeen per cent. Between 1899 and 1923, the capacity of this equipment increased 260 per cent. If converted into man-power, this amount of horsepower would furnish sixty servants for every person in the United States.



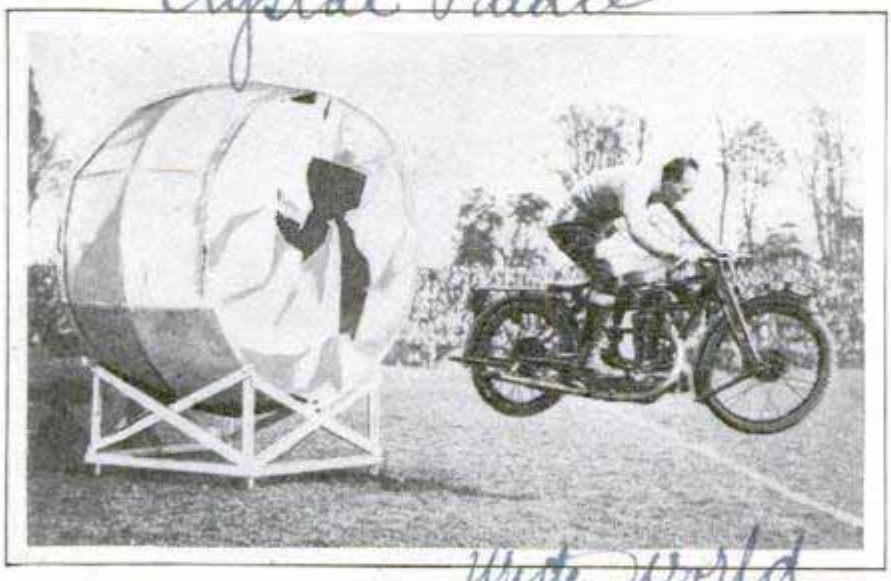
Foam Apparatus, and Drawing to Show Application to Oil Fire

FOAM GENERATOR STOPS FIRES IN OIL STORAGE TANKS

Adapted to the protection of oil storage tanks of moderate size, a foam generating unit has been introduced. It operates automatically, mixing a special fire-smothering powder with flowing water and discharging it to the top of the tank.

CYCLE LEAP THROUGH HOOPS FEATURES MOTOR CIRCUS

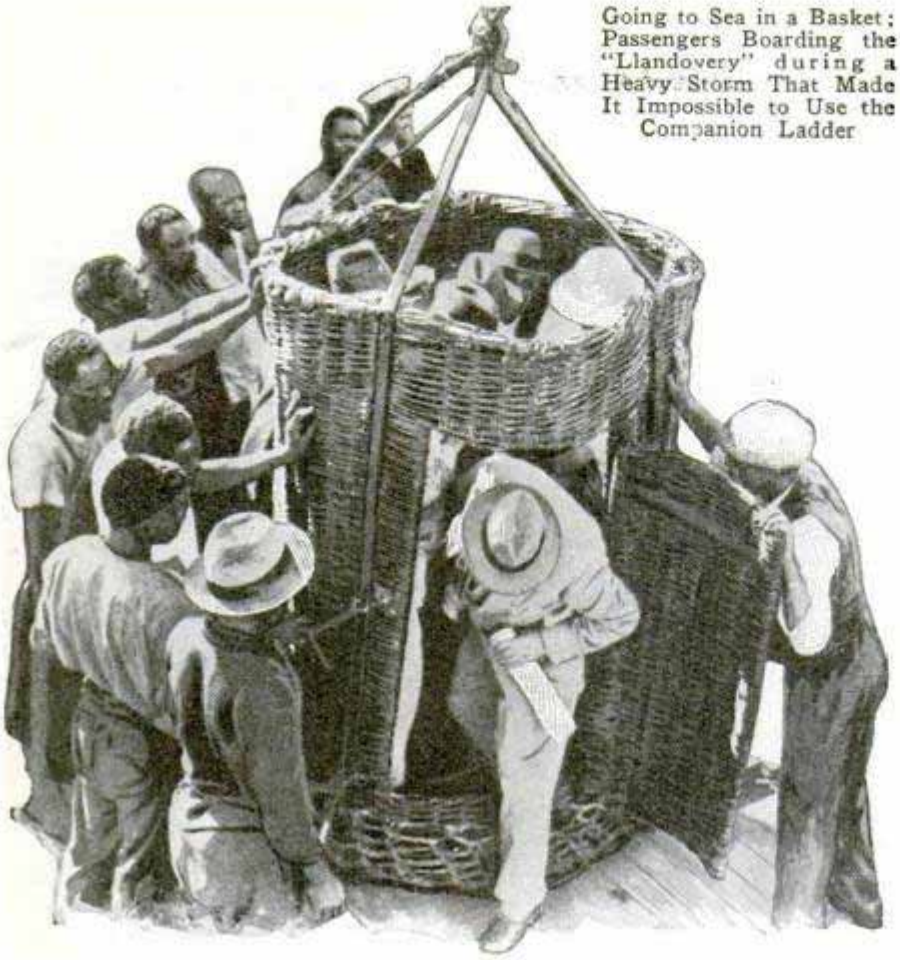
At a recent motorcycle show in London, a rider demonstrated his skill by driving his machine through a double paper hoop while going at high speed. The stunt required a steady hand at the take-off, since the obstruction was of considerable length, and there was danger of turning the front wheel so as to make landing hazardous.



Through the Double Paper Drum; a Motorcycle Thriller

EGGS TESTED WITH EYEBALLS TO INSURE HATCHING

Hatching eggs in incubators is popularly supposed to be a modern method, but it has been practiced for many years in Egypt. The incubator is a dome-shaped building of mud and brick with six compartments, each having a capacity of about 500 eggs. Heat is furnished from smoldering barley and wheat straw which is spread in troughs. To determine if the eggs are being kept warm enough, the attendants hold them against their eyeballs. It is said that a high percentage of chicks are hatched in this way.



Going to Sea in a Basket; Passengers Boarding the "Llandovery" during a Heavy Storm That Made It Impossible to Use the Companion Ladder

PASSENGERS PUT IN BASKET TO BOARD STEAMER

High seas prevented the use of the companion ladder when passengers wished to board the liner "Llandovery" at Port Elizabeth, South Africa, recently, so a large basket was lowered from a derrick and the travelers swung to the deck without difficulty. The container was fashioned like an elevator car.

CLASPS FOR AUTO SKID CHAINS SIMPLIFY ADJUSTMENT

For easy attachment of skid chains to the automobile tires, a special clasp has been introduced. The links of the side chains are slipped into hooks on the clamp, the car is driven or rolled forward, pulling the chain with it, and, after one revolution, the links are in position for connecting and the clasp is removed.

HUNT MYSTERIOUS "DEATH TREE" IN AFRICA

Explorers have gone into central Africa to search for a strange plant which natives call the "death tree." According to legends, anyone who rests in its shade becomes unconscious and, if not rescued in time, dies. Native criminals are sometimes put to death by being bound and placed under the branches of the tree, according to reports. Pending the findings of the expedition, scientists are reserving opinions concerning the tree. Years ago, the upas tree of Java had a reputation even worse than that of the death tree. It was said to be fatal to anyone who came within ten or twelve miles of it. These stories apparently grew out of the fact that the natives were in the habit of dipping their arrows in the poison sap of the tree.

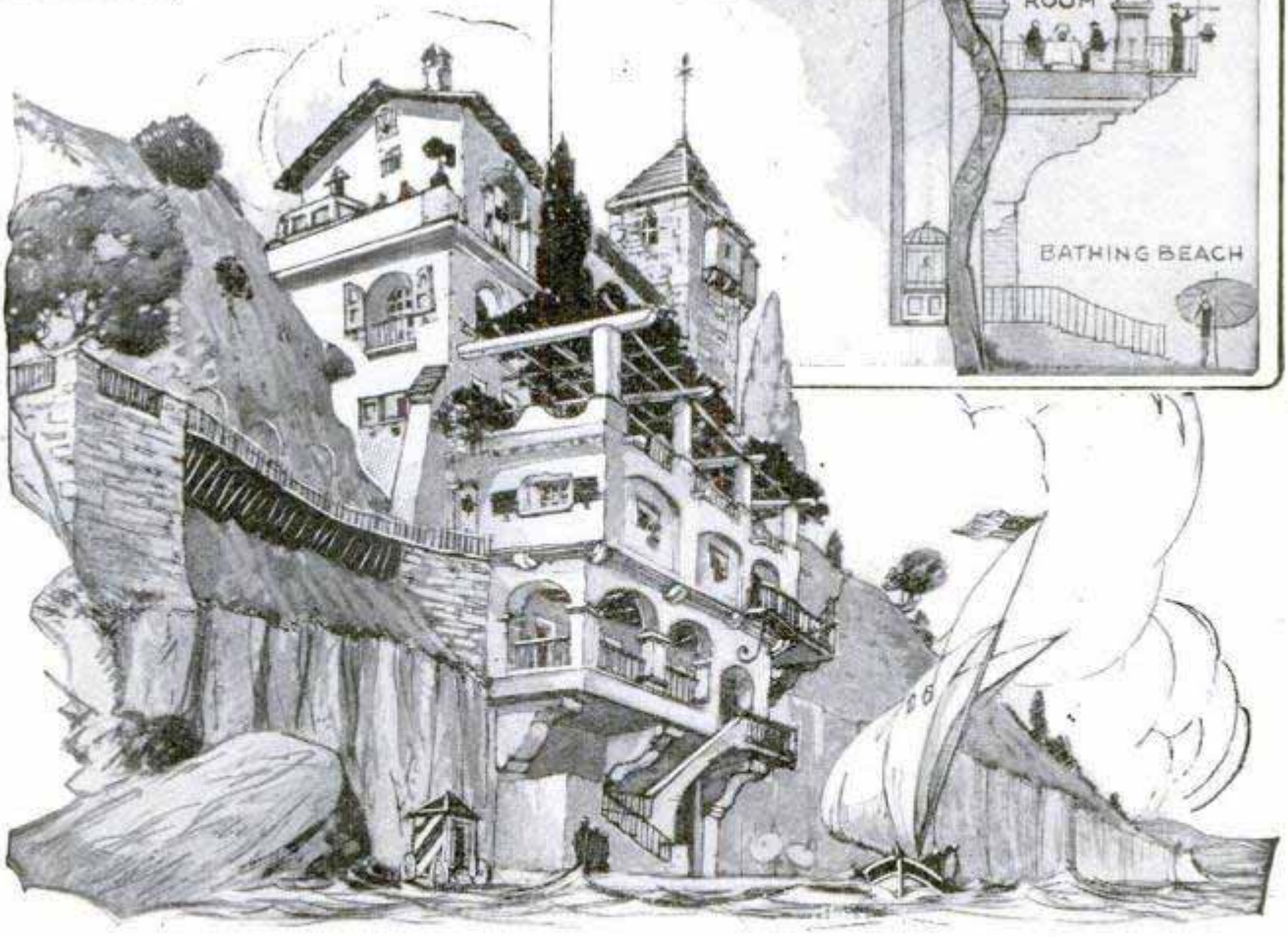
BAG HAS ELECTRIC HEATER TO KEEP WATER HOT

Usefulness of the hot-water bag is increased by inserting a special electric heating unit into the neck to keep the water warm. It is supplied with current from a lighting socket and is not intended to heat cold water, but merely to keep the contents at a high temperature. The attachment may be screwed into any standard hot-water bottle, is safe and consumes but little electricity.

¶Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

MOVIE STARS PLAN HOME BUILT IN SIDE OF CLIFF

A five-story house, clinging to the solid rock at Solano Beach, Calif., has been planned as a home by Douglas Fairbanks and Mary Pickford. An elevator shaft, rising partly within the rock wall of the cliff, will serve the various floors, and drop to the sea level. A driveway on the top of the cliff will reach the garage, built on the same level. Above the garage, will be the library, while adjoining the car space, will be the kitchen. A living room and an open piazza will occupy the next floor below, followed, in turn, by bedrooms and, on the lower floor, the dining room and another open veranda. Both the elevator and open stairs, and an ornamental iron rail, will lead down to the next level, at the water's edge. The plans call for an adaptation of California Spanish architecture.



Artist's Sketches of the Seaside Home Planned by Douglas Fairbanks and Mary Pickford; at High Tide, Boats Will Be Able to Land at the Base of the Cliff, Mooring at a Swimming Float, While from the Topmost Floor a Wide View over the Pacific Will Be Available

Player Posing with the Mechanical Stroke Instructor; It Helps Teach Correct Form for Various Shots

DUMMY AS GOLF INSTRUCTOR SHOWS PROPER FORM

Golf swings are executed in correct form by a mechanical model which shows the proper position of the arms and legs at every point of the stroke. It is adjustable for drives or putts, and enacts every portion of a real stroke even to the follow through.

PHOTOGRAPHS MADE ON STEEL WITH HIGH EXPLOSIVE

Shooting a photograph into hard chrome steel with a high explosive was accomplished recently at the bureau of mines. A camera print was laid on a piece of the steel, about two inches in diameter and an inch thick. A disk of nitrogelatin was placed on top and fired. The paper photograph was completely destroyed but when the steel had cooled, a profile of the subject was found impressed on the surface. Where the picture had been black, that is, in the shadows, the surface of the steel was raised, and where there had been high lights, the steel was cut out. Another example of the effect of explosives in making pictures of this kind was obtained by transferring words impressed into the surface of the block of explosive upon a disk of steel. The action is explained by the fact that, when the explosion occurs, the entire amount of the solid is converted into gas which momentarily has the same shape and size as the original block of explosive. Where there is a cavity in the explosive material, the rapidly moving gas molecules find the line of least resistance for escape and in so doing, they collide with each other, producing a vast number of tiny "drills" which bore into the hardest steel. A somewhat similar result was effected in blowing open a safe with a hollow cylinder of dynamite. A number of sticks were tied into a bundle, the center ones pushed out with a tin can and the rest fired in a vertical position. After the explosion, there was a hole in the safe corresponding to the hollow center in the ring of dynamite stick.

VIOLIN WITH STRAIGHT SIDES IS EASIER TO PLAY

Instead of being curved, the body of a violin constructed by a Chicago maker is angular, the form enabling the player to reach farther on the strings although his fingers may be short, and making the instrument easier to hold under the chin. At the same time, an improvement in tone is claimed for this pattern, less likelihood of breakage and greater simplicity in manufacture with correspondingly less cost.

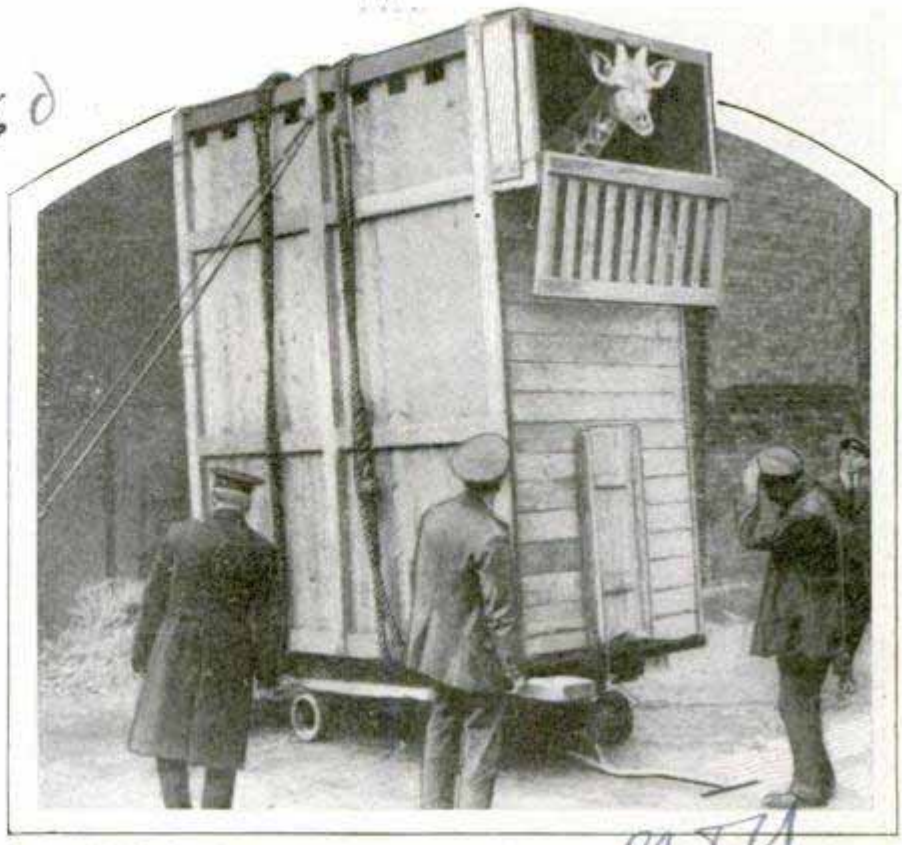
Inventor with Violin of Angular Pattern, Which Is Said to Be Easy to Play

STREET PAVEMENTS OF DIAMONDS IN KIMBERLEY

Blue clay, containing diamonds, was used in paving streets at Kimberley. When the mistake was discovered, the material was scraped up and carefully washed. Thousands of dollars worth of the gems were found, including several large ones. Huge blocks of jasper, topaz and jade were ground up to make roads in Swerdlovsk, Russia, and at Woolwich, England, waste from an arsenal was used for a road. It was found to contain brass valued at nearly $200 a ton. In the East Indies, roads were sometimes made of camphor wood, a rare and costly variety which is now valued for interior panelings and other fine finishes. In the city of Lyons, France, a costly road about one-eighth of a mile long was finished by laying the top with blocks of glass.

MILLION PIECES WASHED DAILY IN SLEEPING-CAR LAUNDRY

To maintain its "household on wheels," the Pullman company washes 1,000,000 pieces of linen daily for its 9,000 sleeping cars. It has sixty-six laundries in different parts of the country, so that fresh equipment may be more easily gathered and the soiled linen collected. A stock of 10,000,000 sheets, pillow cases, towels and sundries is maintained and 100 seamstresses are employed to do the mending. Some 400 persons are required to keep constant check of the bed linen. About 2,000,000 pieces disappear annually and 750,000 wear out.



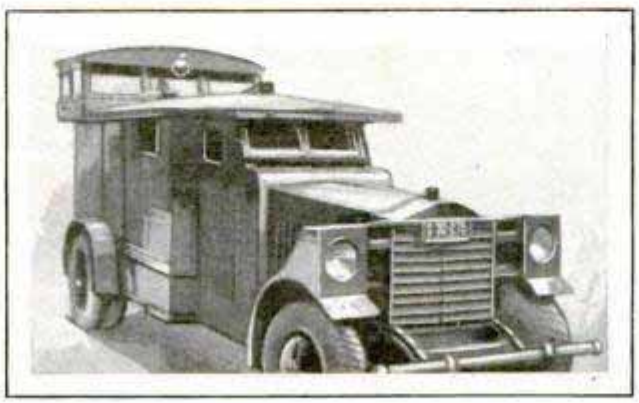
Baby Giraffe in "Skyscraper" Crate for Shipment; the Animals Are Difficult to Keep in Captivity in Northern Climates

"SKYSCRAPER" CAGE IS NEEDED TO SHIP BABY GIRAFFE

Caring for giraffes in captivity is one of the most difficult tasks of the animal keeper as the specimens are delicate and subject to many ailments in northern climates. Shipping them is also a problem. In transporting a baby giraffe, from South Africa to England, recently, a "skyscraper" crate had to be constructed.

OBSERVATORY IN ARMORED CAR HELPS GUARD MONEY

Guards riding with money in an armored car used in a western city, can command a wide view of the street, both in front and to the rear, through an observatory in the roof. The glass windows, windshield and headlights are of the bullet-proof variety, and the radiator and front lamps are also incased partially in armor.



Observation Cage on Armored Car Gives Treasure Guards a Wide View Ahead

585

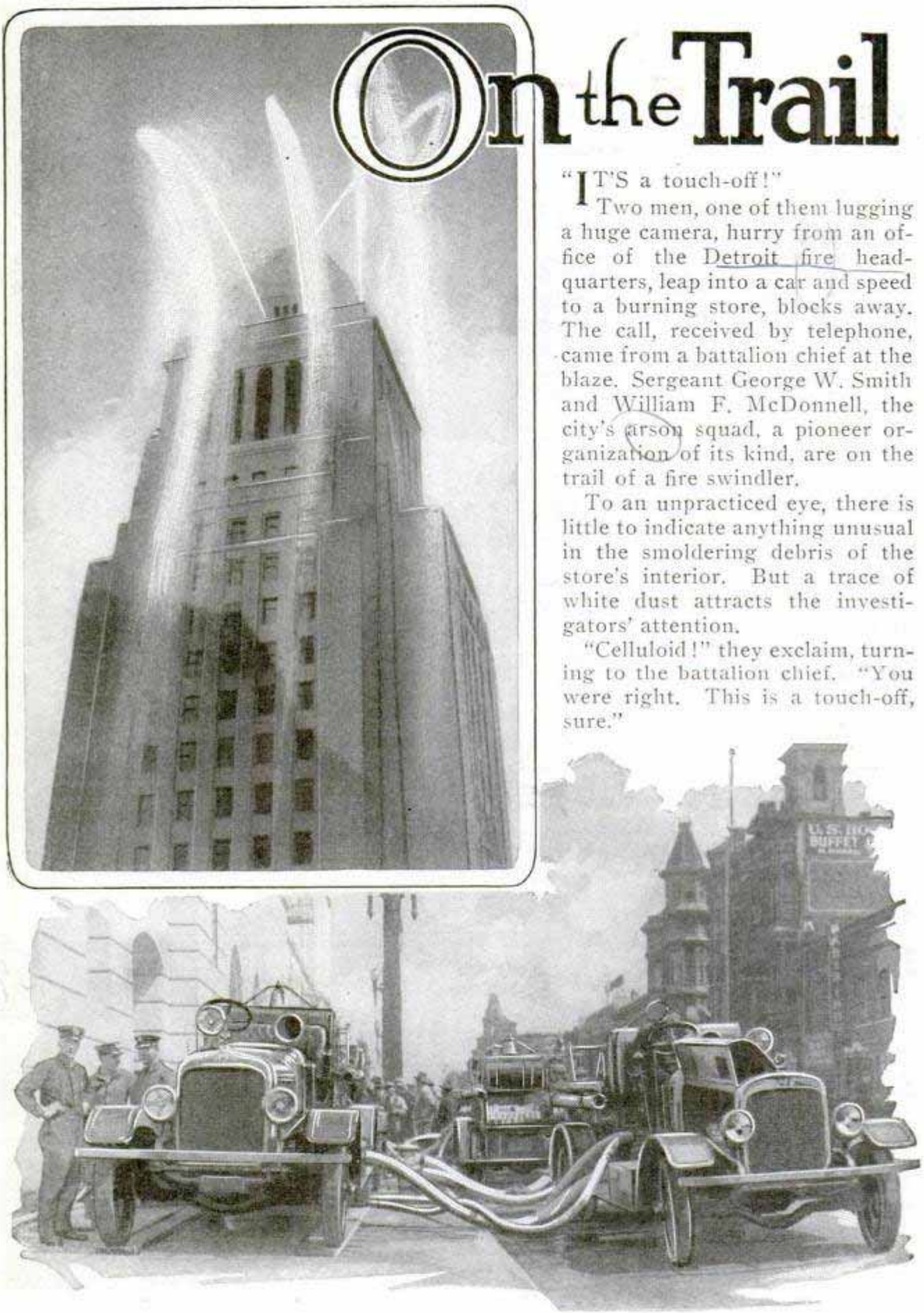
On the Trail

"IT'S a touch-off!"

Two men, one of them lugging a huge camera, hurry from an office of the Detroit fire headquarters, leap into a car and speed to a burning store, blocks away. The call, received by telephone, came from a battalion chief at the blaze. Sergeant George W. Smith and William F. McDonnell, the city's arson squad, a pioneer organization of its kind, are on the trail of a fire swindler.

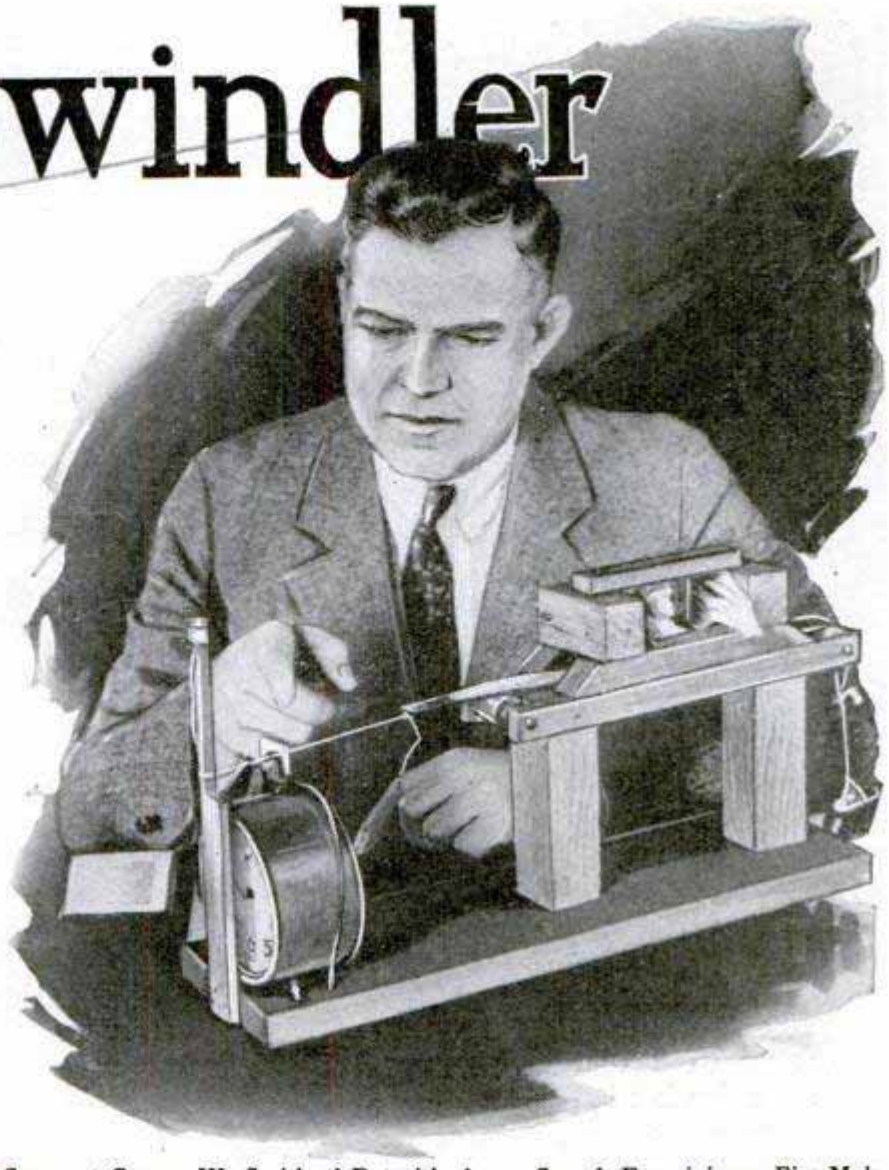
To an unpracticed eye, there is little to indicate anything unusual in the smoldering debris of the store's interior. But a trace of white dust attracts the investigators' attention.

"Celluloid!" they exclaim, turning to the battalion chief. "You were right. This is a touch-off, sure."



Modern Skyscrapers Are Relatively Fireproof, but Powerful High-Pressure Systems Are Installed for Added Protection; Here, Engines Are Pumping Water through the Lines to the Top of the Tower on the New City Hall in Los Angeles

of the Swindler



Sergeant George W. Smith of Detroit's Arson Squad, Examining a Fire-Making Machine; This One Failed to Work and the Swindler Was Caught

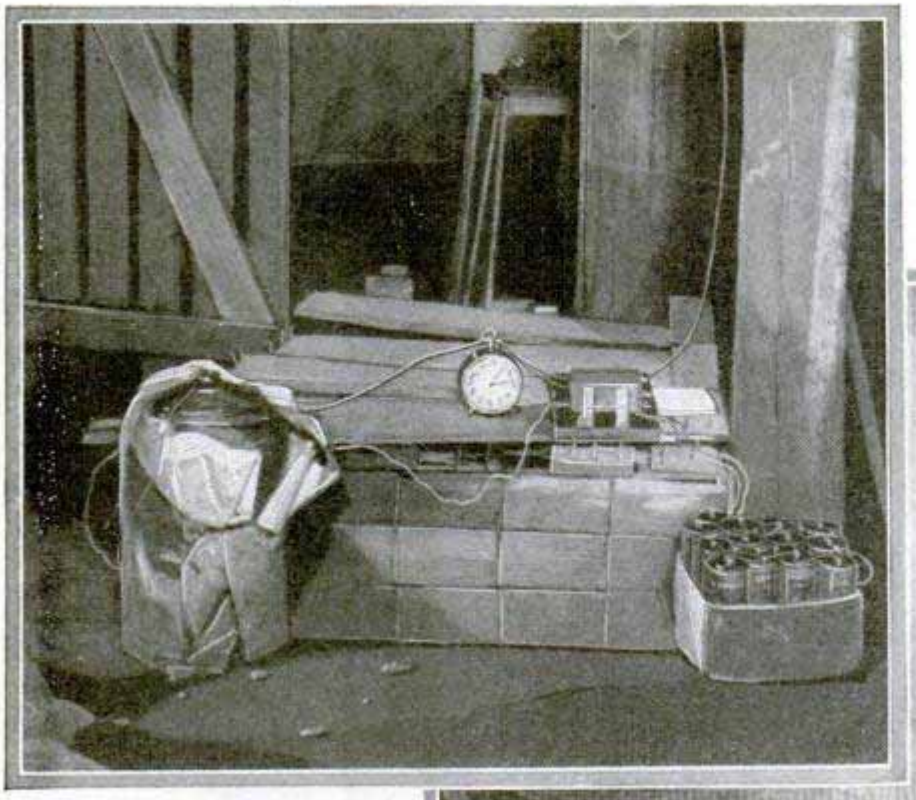
"I suspected something was wrong. No wonder three fires popped up at once," says the chief. The dust, sprinkled along the floor, had fed the hungry flames like gunpowder.

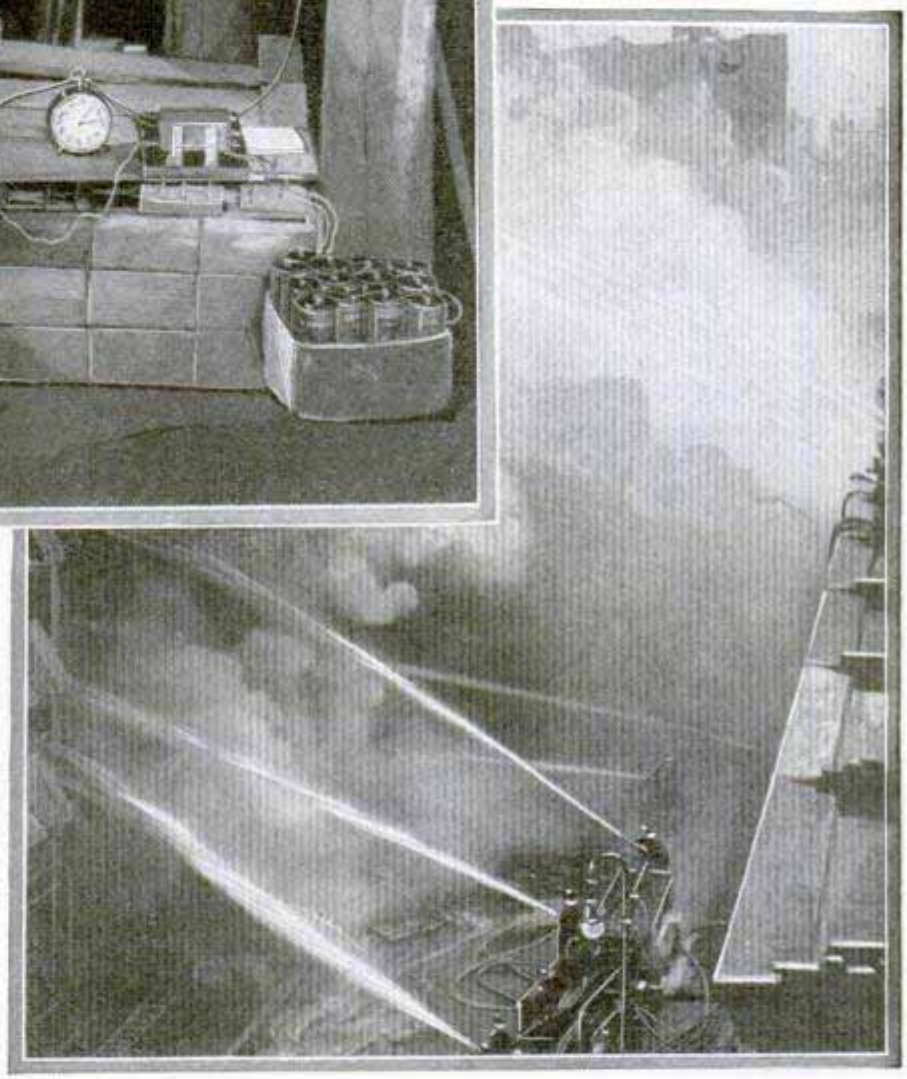
Sergeant Smith, who takes and develops all pictures himself, sets up his camera and snaps a half dozen views of the interior of the store. McDonnell scrapes up a bit of the powder. It will be sent to the city chemist for analysis. The merchant's papers, ledgers and other documents are seized. Firemen are closely questioned. Was the store locked when they arrived? Who has the keys? Where is the proprietor? Was the stock piled around the fire? Anything else unusual?

A fight to expose the fire swindler—one of the cleverest, most dangerous and most destructive of all criminals—is on. Since Nov. 1, 1921, Detroit's two-man squad has been engaged exclusively in this kind of work. They started when the city was suffering a veritable epidemic of "touch-offs." Fires were being set by contract. Chief of Detectives Edward H. Fox and Fire Marshal C. S. Goldwater finally decided to "fight fire with fire."

"Trained fire swindlers?" they said; "all right, we'll meet them with men specially trained to discover their tricks." Accordingly, the arson squad, one of the first in the country, was established under the supervision of the police department and composed of an experienced detective and a fireman, both empowered to make arrests and to seize evidence, if needed, without formalities of warrants. In the year the squad started, Detroit's loss from incendiary fires was $755,112.35. The average for the next five years was less than $265,000 annually. During the first ten months of 1921, there was not a single conviction on an arson charge. In November and December of that year, the squad effected three, and, since that time, have obtained thirty-two more. Detroit's insurance rates were lowered in 1923, resulting in a saving of more than $300,000 to the citizens. The arson squad, in the opinion of the insurance companies, was one of the reasons for the decrease.

"If you can't send a man to jail for arson, you can beat him in another way," said Sergeant Smith. "You can take the profit out of his fire. This fact can't be stressed too strongly. Arson does not pay the swindler. He is bound to lose in the end. I don't know of a single case in this city in which the swindler has





Electrical Set-Up Intended to Start a Blaze, but It Failed and the Arson Squad Caught the Maker

actually profited. Since the squad was organized, more than $300,000 in insurance policies have been surrendered by the assured. We are able to convince them that their chances of collecting, when the fire is of a suspicious origin, are slight.

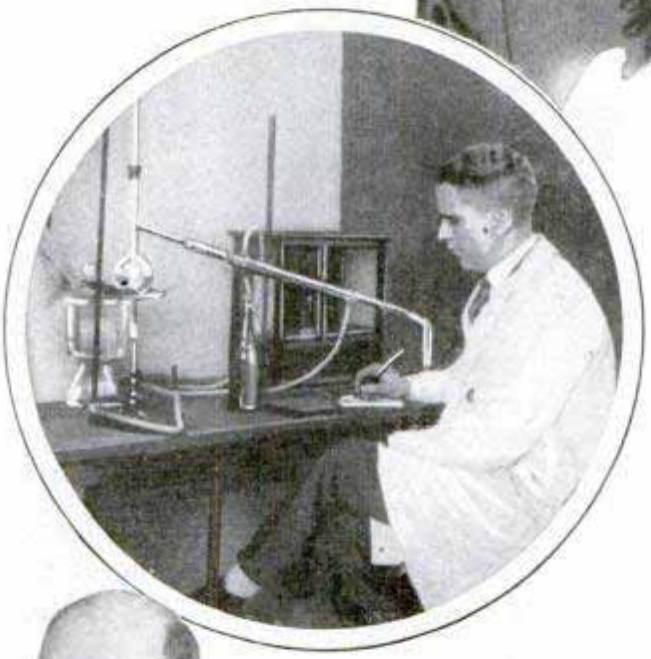
"There are four classes of incendiary fires: Those set to defraud the insurance companies; those for revenge; to cover up another crime, and those started by 'bugs.' In the first three classes, especially, there is often great difficulty in establishing a case. The motive is not always clear and the evidence is frequently burned up.

"The fire bug, that is, the pyromaniac, is not as clever as the swindler, but he is a greater menace. You don't know when or where he will break out. But we have found that he will often become active just after a big fire, with which he may have had nothing to do. The excitement seems to inspire him to some fire starting of his own. During a costly blaze here, recently, a pyromaniac dashed into four office buildings and set eight different fires. He was caught in the act and confessed to setting hundreds of fires throughout the country, among them a hospital blaze. At the time, he had helped take the patients out and place them in a hotel lobby. Then he set the hotel on fire. He's in an institution for the criminally insane now, but the tragedy was that he could not have been caught sooner. Fire fiends often start their careers with the relatively innocent amusement of turning in false alarms for the fun of seeing the engines. But anyone addicted to this malicious tendency should be curbed at once, for he is a potential pyromaniac. When the excitement of seeing the engines has died down, he is likely to try starting fires for an additional thrill.

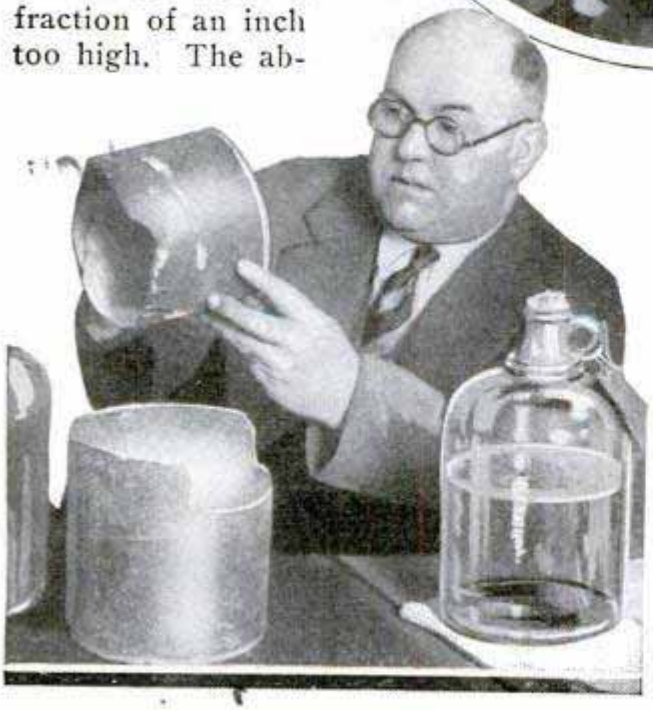
"Our main trouble, however, is not with the pyromaniac. He is usually so clumsy that he leaves clues, and once captured,

his pitiful mental condition is not difficult for a competent physician to determine. In the case of the swindler, we are dealing with a criminal who has no thought for the danger to which he may be exposing others, and who usually is also smart enough to realize that, if possible, he must cover up his tracks. The swindlers are growing more and more clever in their technique, but here is something they often overlook. The very pains they take to start a 'natural' fire, to stage a 'perfect crime,' in other words, may be their undoing. Take a look at this!" He shoved a queer-looking wooden contraption across the desk.

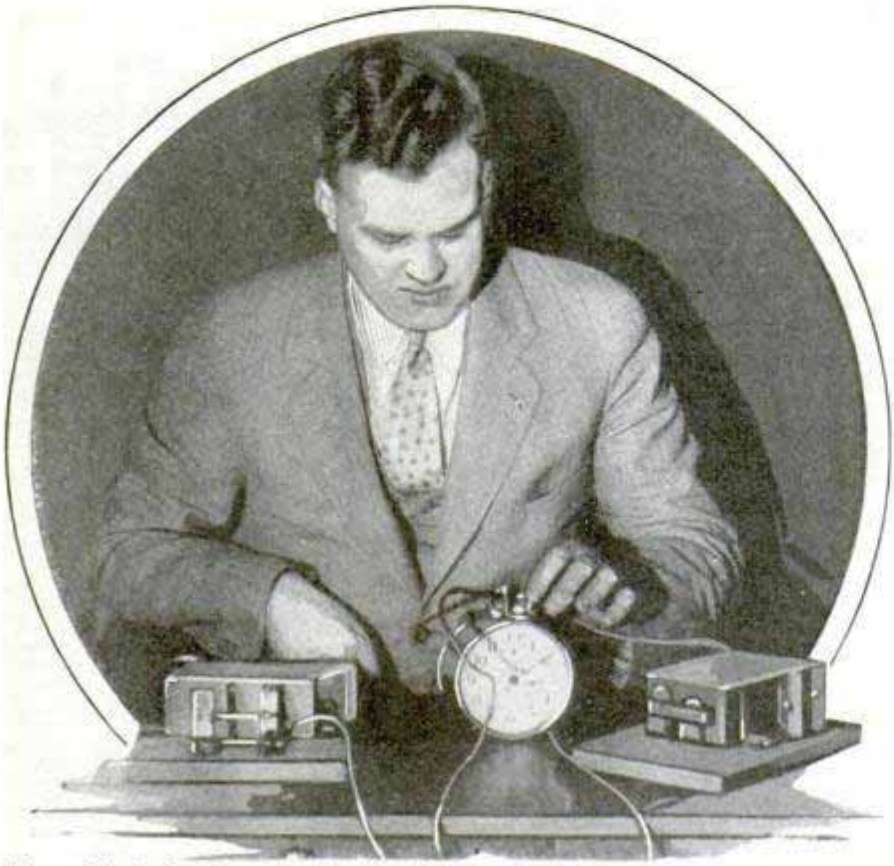
"That's a fire machine and it's a dandy. But, fortunately, it didn't work. Notice that a razor blade is attached to the alarm clock in such a way that, at a certain time, it will vibrate and sever the string, and the weight will pull a strip of abrasive along the place right here, where some matches were inserted. But, in this instance, the matches were a fraction of an inch too high. The abrasive strip didn't touch them. Elaborate fire machines are made with electric coils and batteries, with the aid of candles and other apparatus.



"Sometimes, luck seems to be against the swindler. Not long ago, a man poured ten gallons of high-test gasoline over his store and touched a match. He came flying out through the plate-glass window almost into the arms of a policeman. And he had his insurance policy in his pocket! Another fellow slipped up because he failed to arrange his bed to make it appear as though he had occupied it. He left town after setting things so that his store would catch fire early in the morning. He declared later that he was in a neighboring village and so could not have had anything to do with causing the fire. He even introduced a telegram he had received at his hotel. It was from his wife, telling him about the fire. The message had been delivered all right and he had received it in his room. But he left the hotel at once, the evidence subsequently showed. The point was clinched, when the chambermaid testified that she had found his bed undisturbed



Sergeant Smith and William F. McDonnell Answering Call; Chemist Analyzing Fire Evidence and McDonnell Inspecting Kerosene Container



Alarm Clocks Are Favorite Tools of the Fire Swindler as Well as the Bomber, but Their Use Is Discouraged When Alert Arson Squads Are on Duty

when she went to the room next morning. Had he mussed up the covers, he might have made his alibi hold. Sometimes, but rarely, the swindler's conscience gets the best of him. Not long ago, a man walked sixty-five miles to Toledo after starting a fire here, strolled into the police station there and gave himself up. It happened that we didn't know that this fire was of incendiary origin, but we found that the confessor had told the truth."

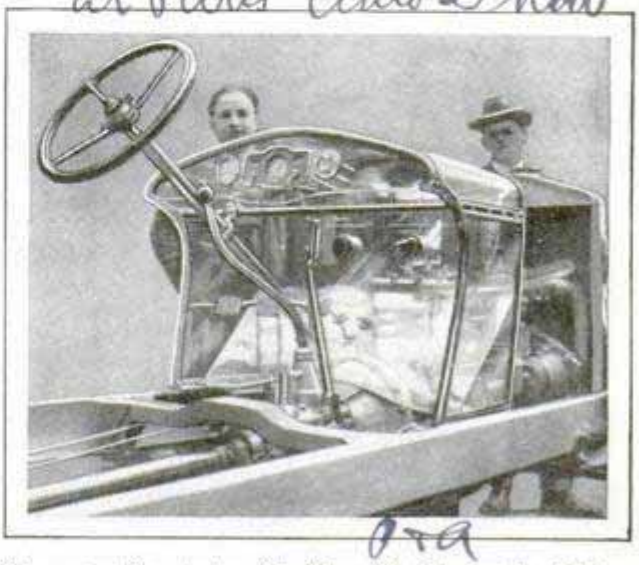
In many cases, careful examination of the books, a thorough inventory and comparison with bills of the wholesalers who sold the dealer his merchandise, will reveal the discrepancy in the storekeeper's statements and show the motive for the fire. Weeks and months are often required in preparing a case for court. The squad leaves no stone unturned in its search for evidence against a swindler. The records are consulted to determine if the person under arrest has been in similar trouble before. In the office of the fire detectives is a complete filing system containing the disposition of court cases the squad has handled, data on arrests, how fires were started, and other information useful in checking up on suspects.

Often a fire swindler will be caught in a net that he least expects—his fingerprints. Convinced that the fire would destroy his trail, he may be careless about handling glass bottles of inflammable liquids he uses in starting the fire, with the result that his finger marks are plainly visible. In examining a suspicious fire, the arson squad makes careful search for evidence of this kind. If the prints are found, they are photographed and checked as usual with the police records in an effort to trace the suspect.

More careful examination of insurance applicants, inspection of premises and repeated check-up of stocks by insurance or other authorized bodies, would help check arson, Sergeant Smith declared.

GLASS HOOD ON AUTOMOBILE PERMITS VIEW OF MOTOR

So that spectators might easily see all exterior parts of the motor, a demonstration car was constructed with a glass hood. This permitted running the engine without exposure and assisted the demonstrators in explaining various points.



Demonstration Auto with Glass Hood over the Motor, So Engine Can Be Seen in Operation

MOTOR FUEL FROM SISAL PLANT SUBSTITUTE FOR GASOLINE

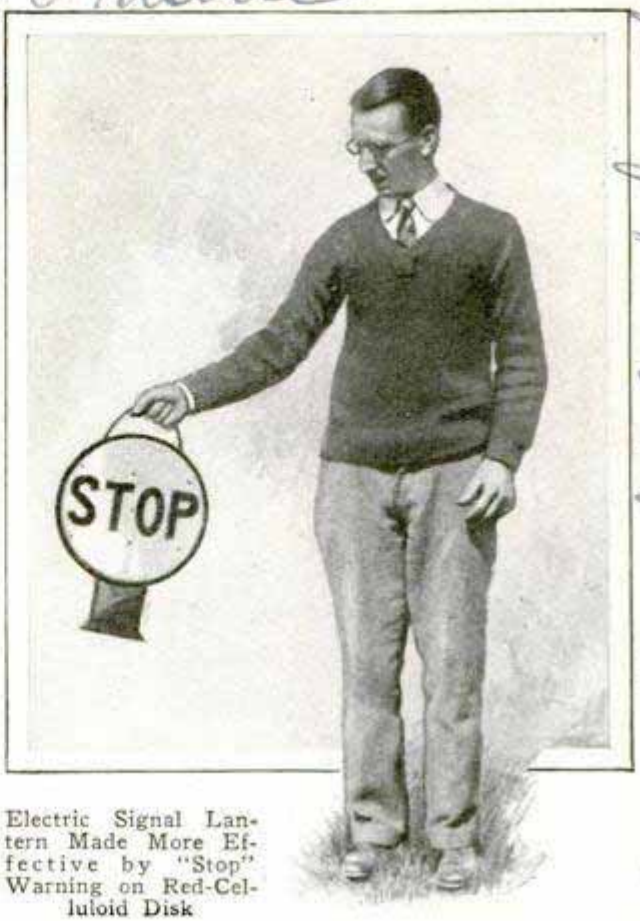
Approximately eighty gallons of motor fuel can be produced from an acre of sisal plant by a chemical process developed in France, it is reported. The leaves and other fibers, ordinarily wasted, are utilized and, under certain conditions, the by-product can be used as fuel without further treatment. Sisal is cultivated on a large scale in northern and western Africa for rope and matting fiber. At a recent exhibition in France motor fuels derived from nuts, corn and bananas were used to run machines, but these products are believed to have too high a value as foods to justify their conversion into gasoline substitutes. The sisal, on the other hand, is said to offer a relatively cheap and abundant supply of material for fuel.

SHEARS AND NIBBLER IN ONE SAVE USE OF DRILL

As a substitute for the usual drill in preparing templates and gauges of metal, a combination of shears and punch has been introduced. It is portable and is said to cut smoothly, requiring little filing, saves time, and can be quickly attached to any vise. Powerful leverage is afforded, and it is designed for accurate work. New parts are fitted with little difficulty.

RECLAIMED U. S. LAND YIELDS BIG CROPS

Land considered practically valueless a few years ago, but later reclaimed by irrigation and other projects, has yielded more than $1,000,000,000 in crops in the last ten years, according to government reports. Last year, the value of crops from this acreage was more than $133,000,000, the highest since the peak of 1919. Alfalfa led all other products from the standpoint of acreage, being grown on thirty-one per cent of the total cropped area of 1,431,560 acres.



Electric Signal Lantern Made More Effective by "Stop" Warning on Red-Celluloid Disk

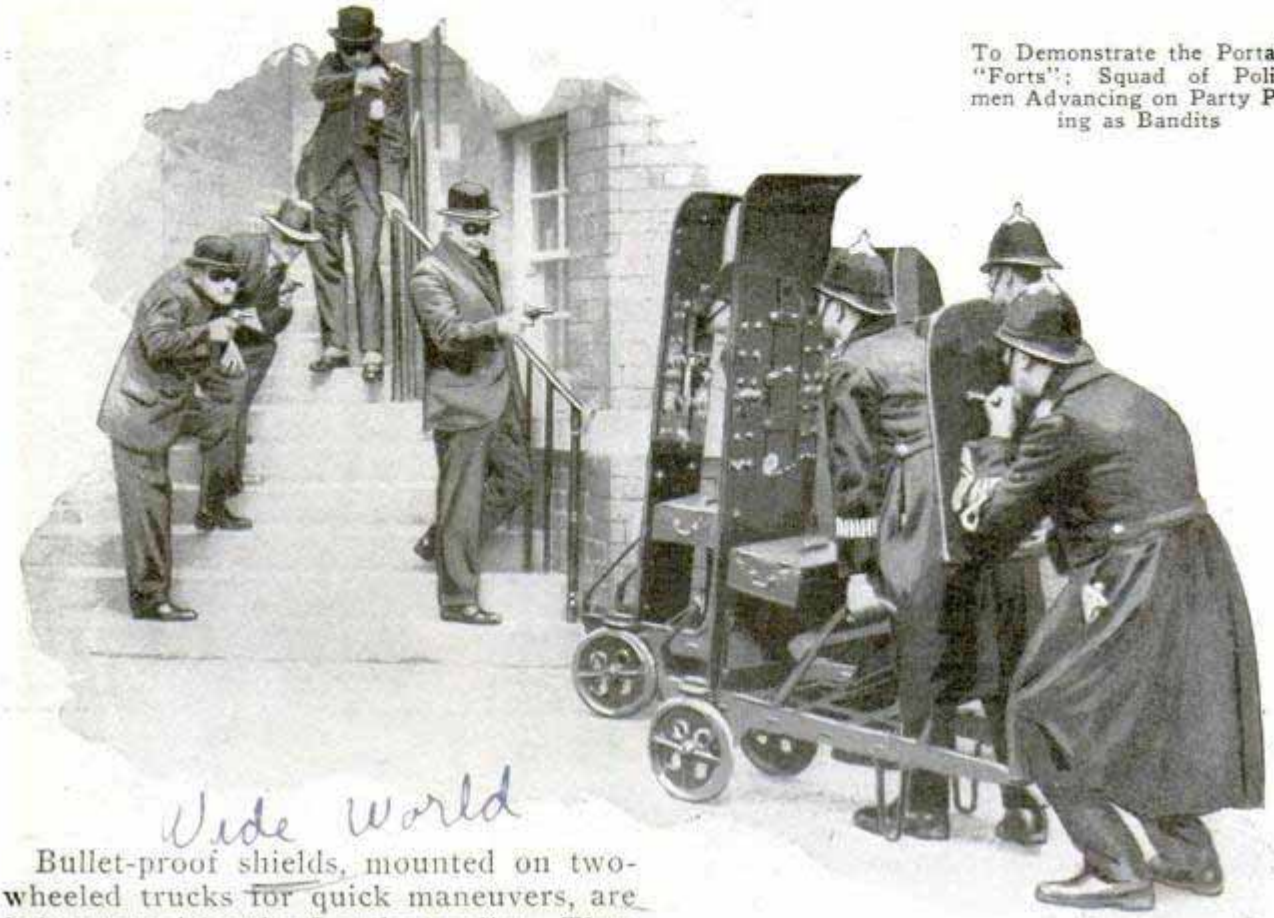
ELECTRIC HAND STOP SIGNAL TO PROTECT PEDESTRIANS

As a substitute for the ordinary red lantern, a western inventor has introduced an electric stop signal for night use at dangerous crossings. It is supplied with current from a battery and, when the bulbs flash on, they shine behind a red-celluloid disk on which is the word "Stop."

SPOON ON METAL BOTTLE CAP AIDS IN TAKING MEDICINE

Designed especially for those who have to take liquid medicines, a bottle has been put on the market with a spoon attached to its metal cap. When not in use, the spoon fits closely to the side of the container and also helps to identify the bottle so that it can be picked from a cabinet with less likelihood of making a mistake.

TWO-WHEELED FORTS AID POLICE WAR ON BANDITS



To Demonstrate the Portable "Forts": Squad of Policemen Advancing on Party Posing as Bandits

Wide World

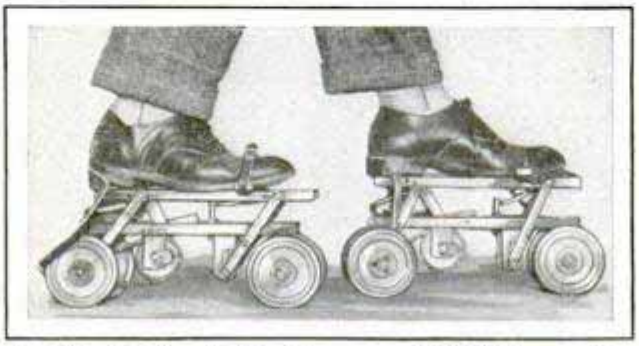
Bullet-proof shields, mounted on two-wheeled trucks for quick maneuvers, are being tested by the London police. They are high enough to protect the entire body and can be set at different angles.

FISH ANSWER CALL TO DINNER AQUARIUM TESTS SHOW

Interesting experiments showing that fish sometimes learn to associate signals of various kinds with food, have been made by an English research worker. A common species of shore fish that likes to make its home in a jar when kept in an aquarium, was taught to respond when the temperature of the water was raised slightly. At first, a worm was dropped into the tank as the heat was applied, and upon seeing it, the fish left its jar to devour the bait. Later on it acted similarly whenever the temperature was raised. Another learned to respond to slight alterations in the salinity of the water. A change of but three parts to 1,000, not enough for the human palate to detect, caused the fish to search for its food after it had learned to associate the change with the bait. Others replied to a tuning fork, to a buzzer and to electric lights. One was taught to enter a food bottle when a light was switched on and wait for the worm.

MODERN "SEVEN-LEAGUE BOOTS" AFFORD HIGH SPEED

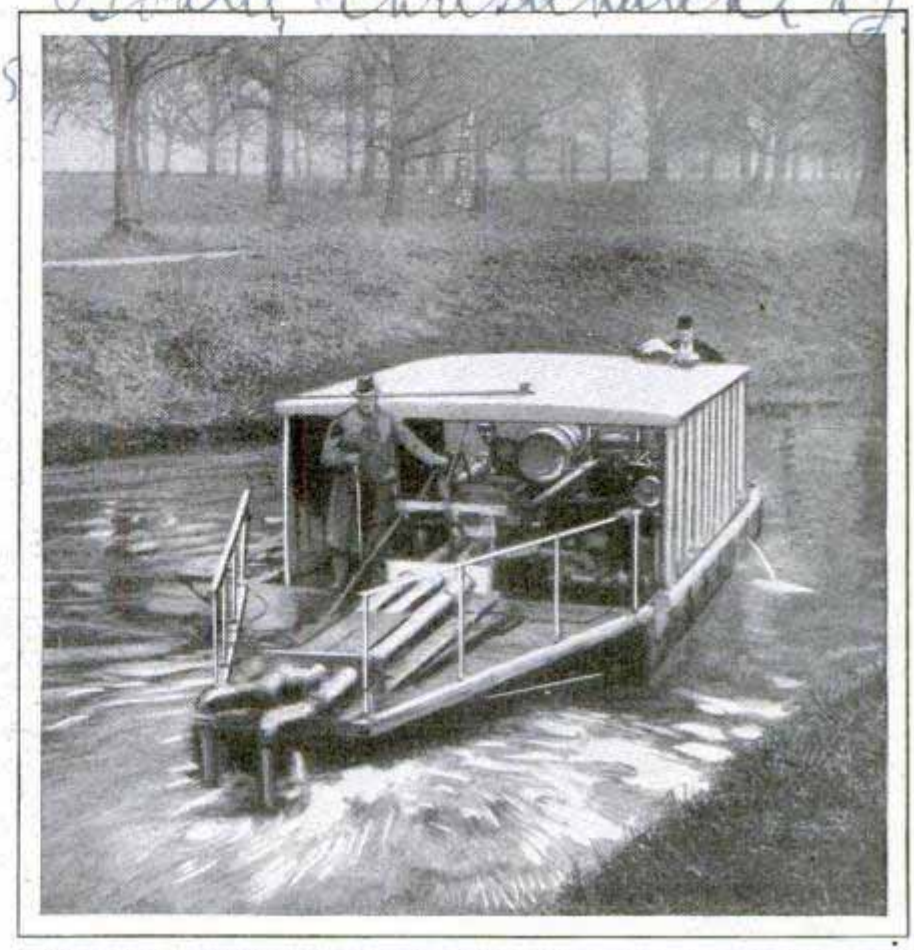
Ordinary walking speeds are accelerated several times, it is claimed, with a pair of spring cog-wheel shoes which were exhibited at a recent show in London. They are somewhat like roller skates with a special driving mechanism, which is said to be easy for the wearer and makes it possible to attain a rate as high as thirty miles an hour.



Cog-Wheel-Drive Roller Skates on Which Person Can Develop Speed of Thirty Miles an Hour

MAN'S ANTIQUITY VIDENCED BY NEW FINDS

Additional proof that men lived upon the earth hundreds of thousands of years ago, has been found in a number of chipped-stone arrow and spear heads imbedded in the banks of the Nile river. The discovery was made by an expedition under the direction of Dr. James H. Breasted, of the University of Chicago, who regards it as an important geological testimony that the men who made the spears must have lived at a time corresponding to that of the Ice Age in Europe. An additional find of interest was that of the skeletons of thirty-one Hittite men and women in a mound of clay formed by the disintegration of the brick homes in which the people lived. The structures are believed to have been built at least 3,300 years ago. From the skeletons, scientists hope to establish the bodily appearance of the Hittites and so contribute to our scant knowledge of them.

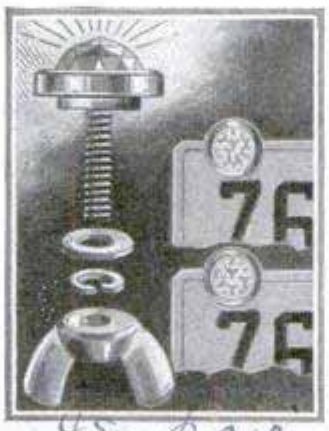


Tri-Motored Sweeping Outfit Removing Mud from the Bottom of the River Avon in New Zealand; Silt Is Stirred Up and Carried Away

MOTOR-DRIVEN RIVER SWEEPER SIMPLIFIES MUD REMOVAL

Mud and debris are quickly removed from the bottom of the river Avon, at Christchurch, New Zealand, with the aid of a three-motored sweeping apparatus. The unit is not a dredge but operates more like the sluicing outfits used in gold mines. Water is pumped up through large pipes and discharged again while a current of air is introduced at the nozzles. This serves to agitate the water, driving the mud and silt into suspension, so that it can be carried off downstream.

JEWELS ON LICENSE BOLTS INCREASE MOTOR SAFETY



Colored reflectors of red and green glass on the license-plate fasteners have been introduced to improve the car's appearance and also to promote safety. The jewels serve as supplementary lights, the red being used behind, and the green for the front plate. The metal parts of the fasteners are plated with a rust-resisting metal.

CROSSING RADISH AND CABBAGE LATEST PLANT TRIUMPH

What is regarded as an achievement in plant breeding has just been accomplished in the production of a cross between a cabbage and a radish. The two are of remote relationship, hence the hybrid is considered far more remarkable than those yielded by crossing varieties that more closely resemble each other.

Policeman Using Portable Radio Loud-Speaker Set for Giving Orders; the Pole Is Collapsible

PORTABLE LOUD-SPEAKER SET LATEST AID TO FOREMEN

For bosses of street gangs, police and others who must address crowds, a portable loud-speaker apparatus has been introduced in Germany. It consists simply of a horn, batteries, microphone and a sectional pole to support the horn. The outfit is quickly assembled and is constructed for long service.

SEA OVER SEVEN MILES DEEP ECHO MEASURES SHOW

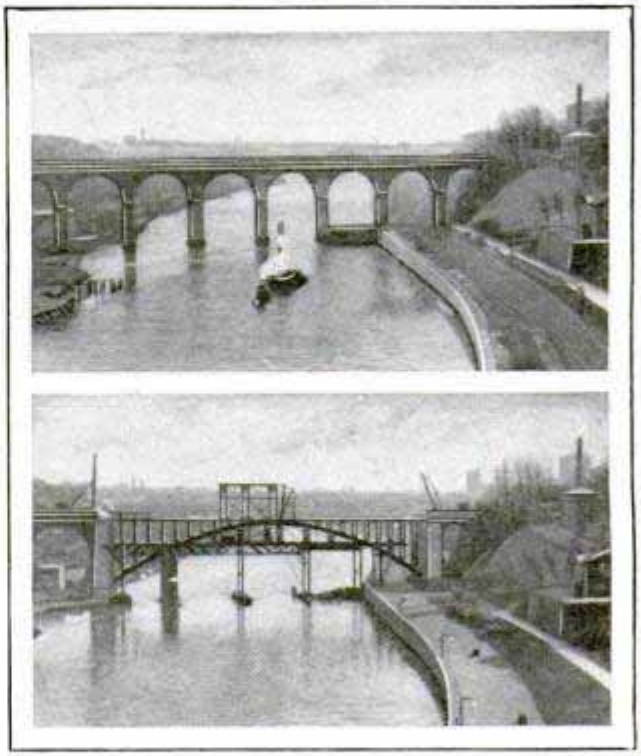
Depths of between seven and eight miles have been found in the ocean by means of the recently developed echo-sounding apparatus. This system of measuring the depth of the water is considered a great improvement over the former method of sinking a lead which could rarely be used for a depth greater than five miles. By the echo measurements, revised and more accurate charts of the ocean's floor are being made. They indicate that the "canyons and valleys" at the bottom of the sea exceed in depth the height of the loftiest mountain ranges on land.

THREE HUNDRED AIR SCHOOLS SHOW AVIATION'S GROWTH

According to reports of the department of commerce, more than $6,000,000 is invested in air companies engaged in regular flying operations and there are now over 300 schools of aviation in this country. Planes and engines valued at nearly $24,500,000 were produced in 1926 and 1927, and last year companies engaged in regular transportation by air flew 5,809,999 miles on scheduled trips and carried 8,500 passengers, 2,261,507 pounds of express and 1,654,454 pounds of mail.

LONG STEEL SPAN IN BRIDGE REPLACES STONE ARCHES

Five Roman arches in the famous high bridge over the Harlem river in New York are being replaced by a single span of steel, 426 feet long. The reconstruction was necessary as the water, swirling about the stone piers, had made them unsafe, particularly because the bridge carries the water of the Croton aqueduct. Although the expense involved is large and the work demands great engineering skill, the bridge will cost some $500,000 less than would have been required by the alternative of driving a tunnel under the river to carry the water.



Old High Bridge over the Harlem River and the New Structure, Below, Showing Span under Construction

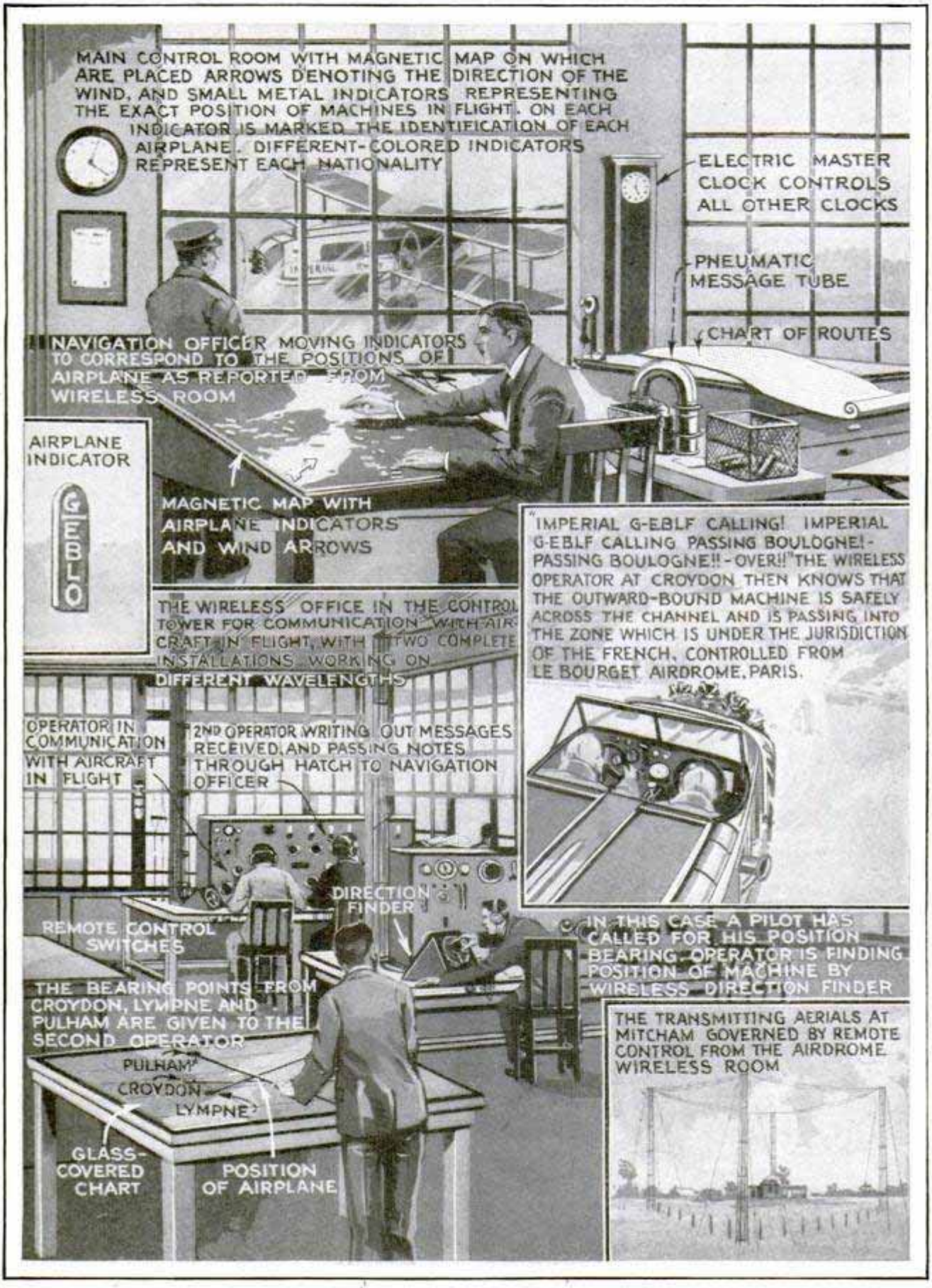
BRITAIN'S BID FOR THE WORLD'S AIR CAPITAL

© The Illustrated London News

4/21/28 O. 908

At Croydon Field, the London Airport, England Has the Finest Air Terminal Yet Constructed, Since the Recent Opening of the New Buildings; a Feature of the Waiting Room Is the Clock Board That Shows Arrivals and Departures over All Europe

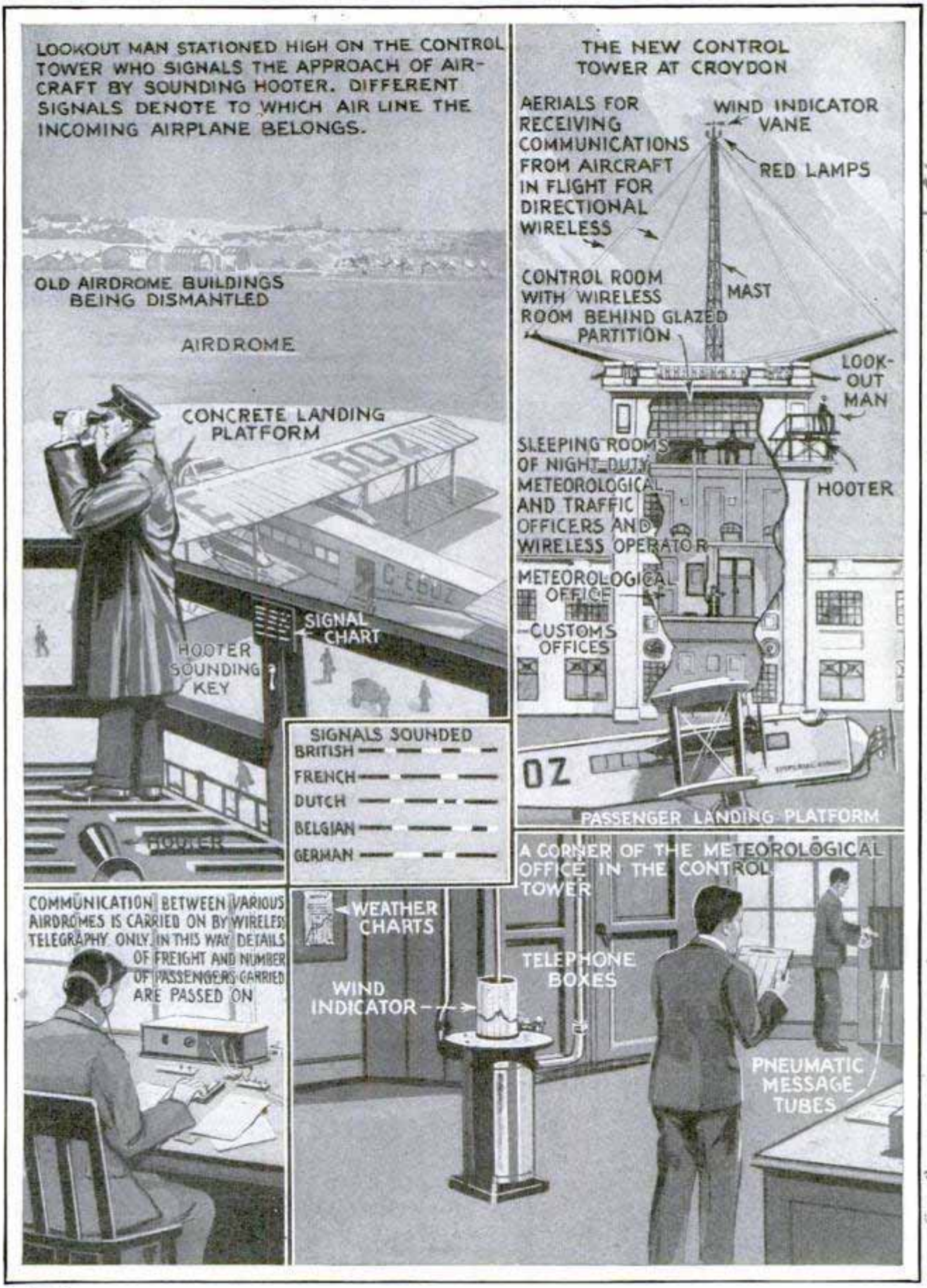
THE TRAINMASTERS OF THE AIR WHO USE RADIO



© The Illustrated

The Control Tower atop the Croydon Terminal Is a Busy Place When Planes of Five Nations Are Arriving and Leaving; Magnetic Maps, Wireless Weather Reports and a Complete Weather Observatory Help the Aerial Trainmaster Keep the Traffic Moving

AND WEATHER CHARTS TO DIRECT TRAFFIC MOVES



London News

The Cross Section of the Control Tower Shows the Operating Side of the Big Airdrome from Which a Net of Air Lanes Spreads over Europe; a Horn, Called a "Hooter" in England, Signals the Nationality of Planes Sighted on the Far Horizon

End View of the Swinging Park Seat, Showing the Coin-Slot Compartment and Locking Mechanism

COIN-IN-SLOT SWINGING SEAT LATEST PARK CONVENIENCE

Patrons of parks, amusement resorts, and other places may enjoy a reserved swinging bench as a result of a California inventor's product which has just been introduced. Dropping a nickel in a slot of the locking mechanism at the side tips the seat up for use and the bench automatically returns to a tilted position when the occupant leaves it, so that the next person also must insert a coin.

KETTLE GIVES WHISTLE SIGNAL WHEN FOOD IS COOKED

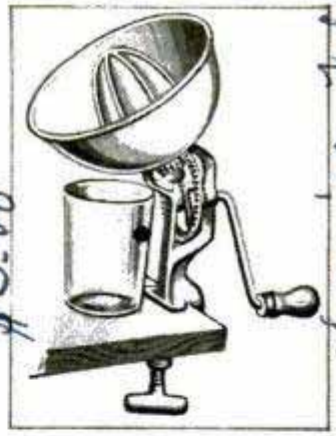
Suited especially to boiling eggs or cooking vegetables, a kettle now on the market has a small steam whistle in the cover. This sounds when the contents have been cooked to the proper degree, thus insuring more satisfactory dishes and reducing the amount of waste. Fuel is also saved, especially when cooking with gas or with electricity, as it may be reduced or turned off when the whistle blows.

SAFETY RAZORS' THICK BLADES LAST INDEFINITELY

A safety razor using full hollow-ground thick blades, the same as an old-style implement, has been marketed by an English firm of razor and sword makers. Unlike other safety types, the blades of the new razor are not discarded, but are rehoned after each shave and used indefinitely. The original safety razor was a guard on an old-style blade, but did not prove satisfactory because the honing problem was still left. Then came the clear thin blade, which could be discarded. With the development of satisfactory automatic strippers, the new-type blade was made possible. It looks like a short section of the usual thick blade.

FRUIT SQUEEZER FITS ON TABLE AND SAVES TIME

Quickly clamped to a bench or table, a hand-crank fruit squeezer removes the juice from large or small oranges, grapefruit, lemons and other fruits without soiling the hands. The crank turns a ridged cone-shaped member like that of the small glass extractors and, by pressing on the fruit with the other hand, practically all of the juice is quickly removed. The squeezer is easily cleaned and durable.



AIR-RAIL PASSENGER ROUTES TO SPEED TRAFFIC

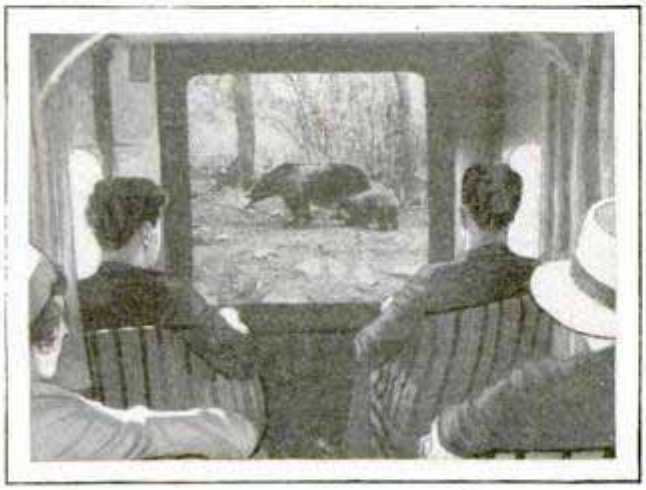
Regular journeys from coast to coast in forty-eight to fifty-two hours, are planned by joint airplane and railroad transportation. Passengers would use the trains at night and the planes by day. A traveler going from New York to St. Louis, for instance, would start at six o'clock in the evening by rail and transfer to an airplane at Columbus, Ohio, the next morning, arriving at his destination hours ahead of the train schedule.

HIGHEST TIDES ON ATLANTIC COAST

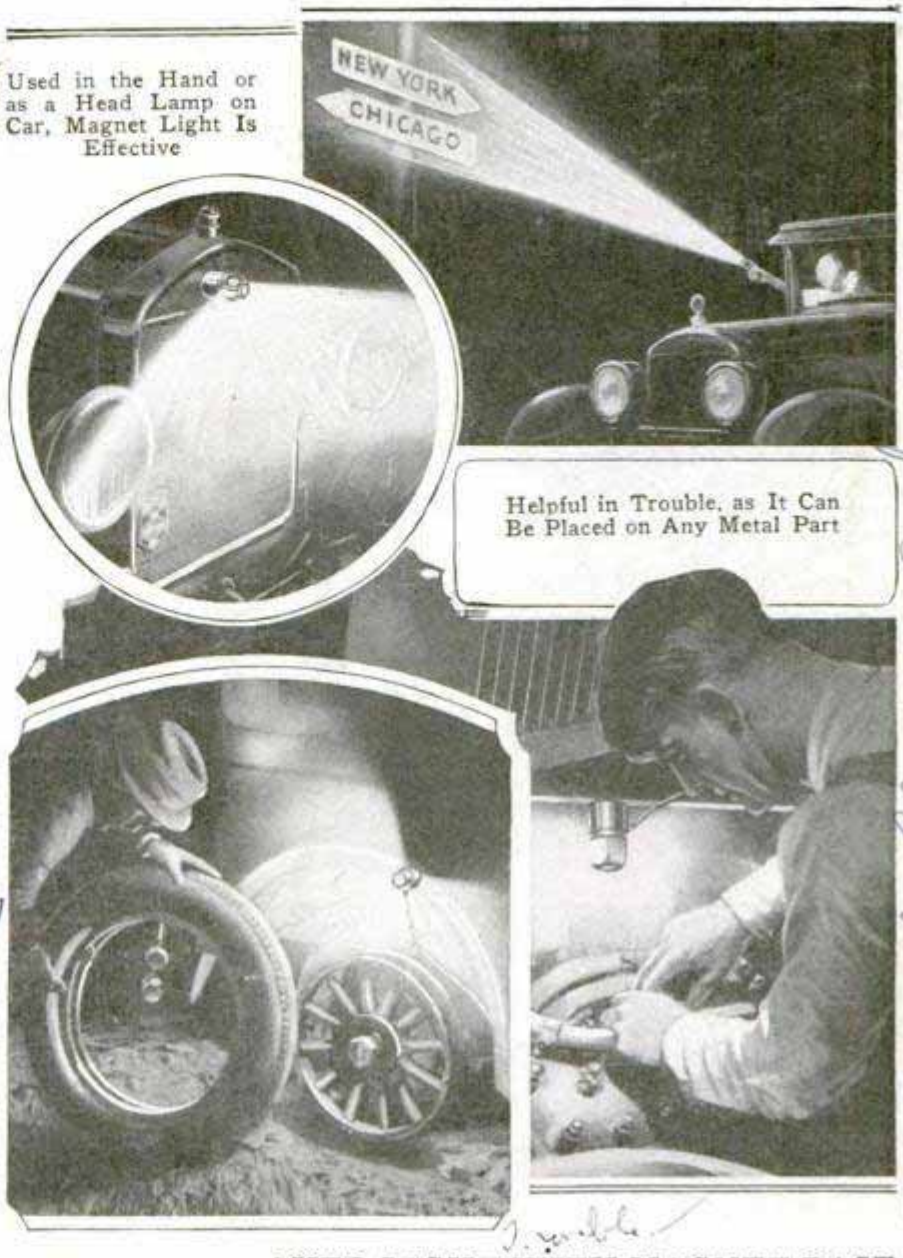
According to the latest records, the highest tides occur along the Atlantic coast, where the range is from one to fifty feet. The highest are found in the Bay of Fundy. In New York harbor the range is about four and one-half feet, while at Eastport, Me., only a few hundred miles distant, the tides have a range of twenty feet. Boston's tide rises ten feet, while at Key West, Fla., the ocean's tidal variation is but one and one-half feet.

MOVING PICTURES EXHIBITED ON AIRPLANES

Motion pictures were shown to passengers on an airplane trip in California recently, the innovation proving so popular that the company has decided to include the feature as a regular part of all long journeys. The screen was stretched at the forward part of the cabin. A five-reel comedy was displayed. Looking at the pictures is said to offer relief for those who are affected by flying.



Airplane Passengers Enjoying Motion-Picture Film; the Show Helps Prevent Air Sickness



Used in the Hand or as a Head Lamp on Car, Magnet Light Is Effective

Helpful in Trouble, as It Can Be Placed on Any Metal Part

AUTO LIGHT WITH MAGNET BASE FITS ANYWHERE ON CAR

Both hands are left free for work and the trouble of adjusting a clamp is saved with an emergency auto light that has a strong, magnet base. It is magnetized by passing current from the automobile batteries through it.

BRONZE GRILLE ON HOUSE DOOR GUARDS AGAINST BURGLARS

To protect residences against burglars, a door now on the market has a strong bronze grille with a secondary door which can be opened to talk with the person outside without opening the main door. The grille is on the outer side and there is a screen for additional protection between it and the inner sash, which swings back.

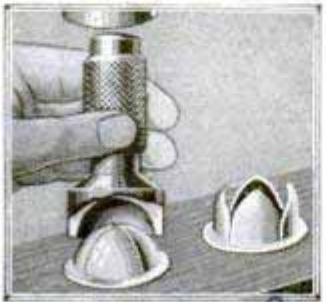
Parachute Jumper Wearing the Fabric Fin Which Helps Prevent Spinning in Descents

FIN FOR PARACHUTE JUMPERS AIDS SAFER DESCENT

So that the jumper may more easily guide himself while falling through the air and also avoid twisting and turning immediately after stepping from the plane, a fin arrangement has been devised for the parachute man. It is simply a web of fabric, pulled on over the legs and functions somewhat like a fish's fin or rudder, to keep the wearer more steady in the air. Its chief aid comes before the parachute has opened, as, after that, most of the steering and guiding is done by pulling on the ropes of the canopy.

CROWN WASHER TO HIDE NUTS IMPROVES LOOKS OF WORK

Quickly set over nuts or screws, a crown washer gives a better appearance to the surface and protects the unit beneath. It can be painted over, giving the appearance of rivets, or may be plated to add a touch of brightness. As a protector, it prevents tampering with screws and nuts.



COAL SMOKE CAUSES COLDS CHEMIST SUGGESTS

Gases from the smoke of soft coal may be partly responsible for colds, in the opinion of Prof. Samuel W. Parr, of the University of Illinois. He suggests that the effect upon the nose and throat tissues of the billions of cubic feet of sulphur dioxide and other vapors that pour from the nation's chimneys each year be investigated. Approximately ninety per cent of the fuels burned in this country produce smoke, it is said, and the amount of soft coal consumed totals over 600,000,000 tons annually.

AUTO DRIVER'S POSTURE PAD PROMOTES HEALTH

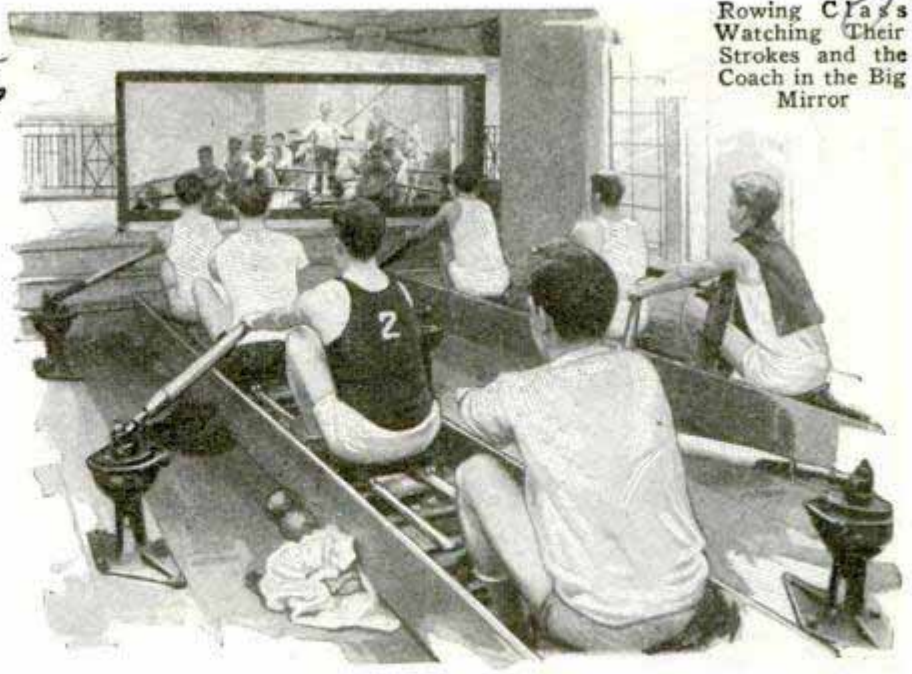
Greater comfort and avoidance of troubles resulting from improper posture are claimed for a special cushion devised for the automobile driver. It is shaped to give support to the back where it is most necessary, is molded and padded and is quickly adjusted.

GLACIERS TELL THEIR SECRETS IN CLOCKWORK "DIARY"

Glaciers move spasmodically and not in a uniform manner, like a stream of oil, as has been held by some scientists, evidence gathered by Prof. R. T. Chamberlin, of the University of Chicago, shows. For seventeen years, he has been studying ice fields in Canada, Alaska and Switzerland and has obtained the glaciers' own story of their movements by means of a clockwork mechanism which scratches telltale lines on a disk as the ice moves. These "diaries" indicate that there is a sudden slippage when the ice yields to an accumulated stress.

ULTRAVIOLET RAYS REVEAL TOOTH CAVITIES

By directing ultraviolet rays upon the teeth, dark spots, where small cavities are beginning to develop, have been revealed in tests conducted at Northwestern University dental school. The teeth react to the rays by shining brightly with a visible light, but if a cavity is forming, that spot does not glow under the rays even though no coloring matter has yet appeared. Further investigations of this method of examining the teeth are expected to lead to the development of ultraviolet lamps with which a competent dentist may make a thorough inspection and remedy cavities before they have done harm.



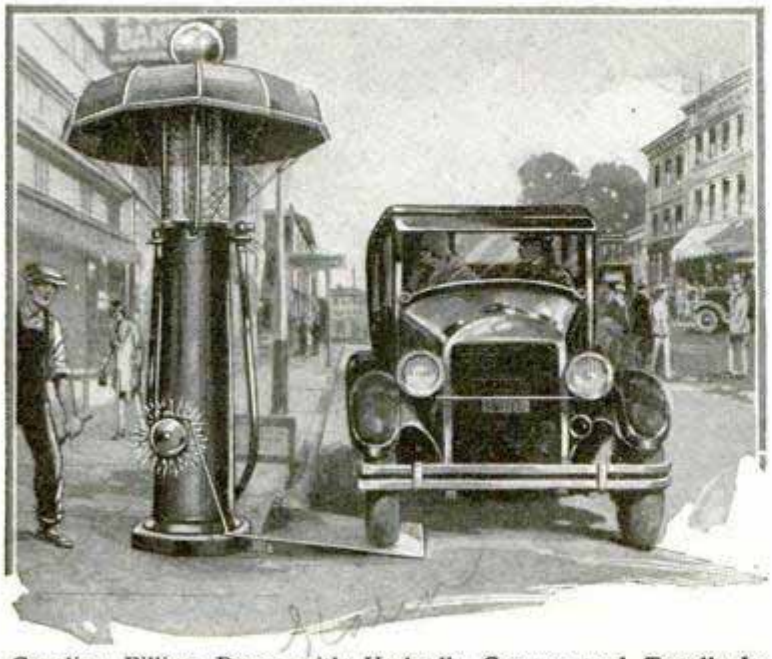
Rowing Crews Watching Their Strokes and the Coach in the Big Mirror

ROWING PRACTICE WITH MIRROR HELPS TRAIN OARSMEN

So that they may more easily correct their mistakes and learn to stroke together, boys training for the crew of an eastern preparatory school, practice in front of a large mirror. This enables them to see the effect of the coach's directions and gives each man a clear view of the entire crew.

UMBRELLA-TOP GAS STATION HAS AUTOMATIC GONG

To shelter himself from the rain while operating a gasoline pump, a western service-station man constructed a metal top over it in the form of an umbrella. He also rigged a gong signal, so that, when cars drove up, it would ring, telling him that a customer wanted service.



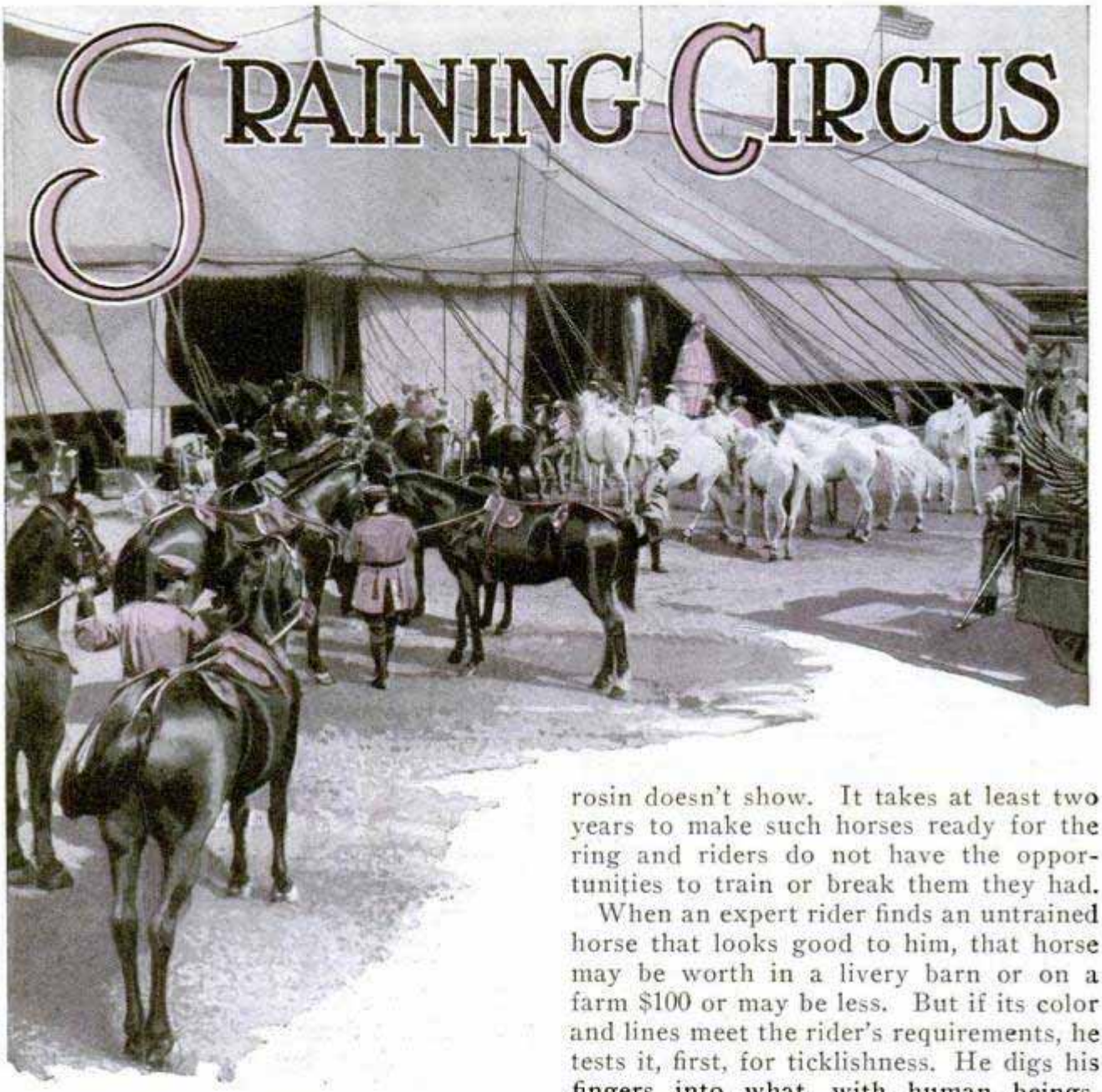
Gasoline Filling Pump with Umbrella Canopy, and Treadle by Which the Car Sounds Bell Signal for Service

LIFE OF RUGS IS FIFTEEN YEARS, EXPERTS SAY

Dropping cigar ashes on rugs or carpets will not damage the fabrics, experts declare, but may have a beneficial effect instead, for the ash is displeasing to moths. With proper care, a rug or carpet of good quality should last at least fifteen years, it is said. In sweeping, the strokes should be with the nap and not against it. Uneven floors and travel over the rugs may cause them to change shade in spots. This difficulty can be remedied by turning them frequently and lining them. In using a vacuum cleaner, the attachments should be properly adjusted to prevent damaging the rugs, and using a beater is often harmful as it breaks the strands. Face powder, dropped upon the rug, often permanently spots it.

298 4

TRAINING CIRCUS



By EARL CHAPIN MAY

ALTHOUGH most of them live in daily danger of nasty falls and other accidents and are listed as extra-hazardous risks by life-insurance companies, circus riders are quite as particular about their horses as about themselves, especially their "principal" and "finish" horses.

A principal horse is one on which the beautiful lady rides around the magic ring. Such a horse is, preferably, one with a broad back and a large barreled body and thin legs. It should be gray or white because a principal horse is a "rosin-back," that is, its back is covered with powdered rosin to keep the rider from falling off. If the horse is gray or white the powdered rosin doesn't show. It takes at least two years to make such horses ready for the ring and riders do not have the opportunities to train or break them they had.

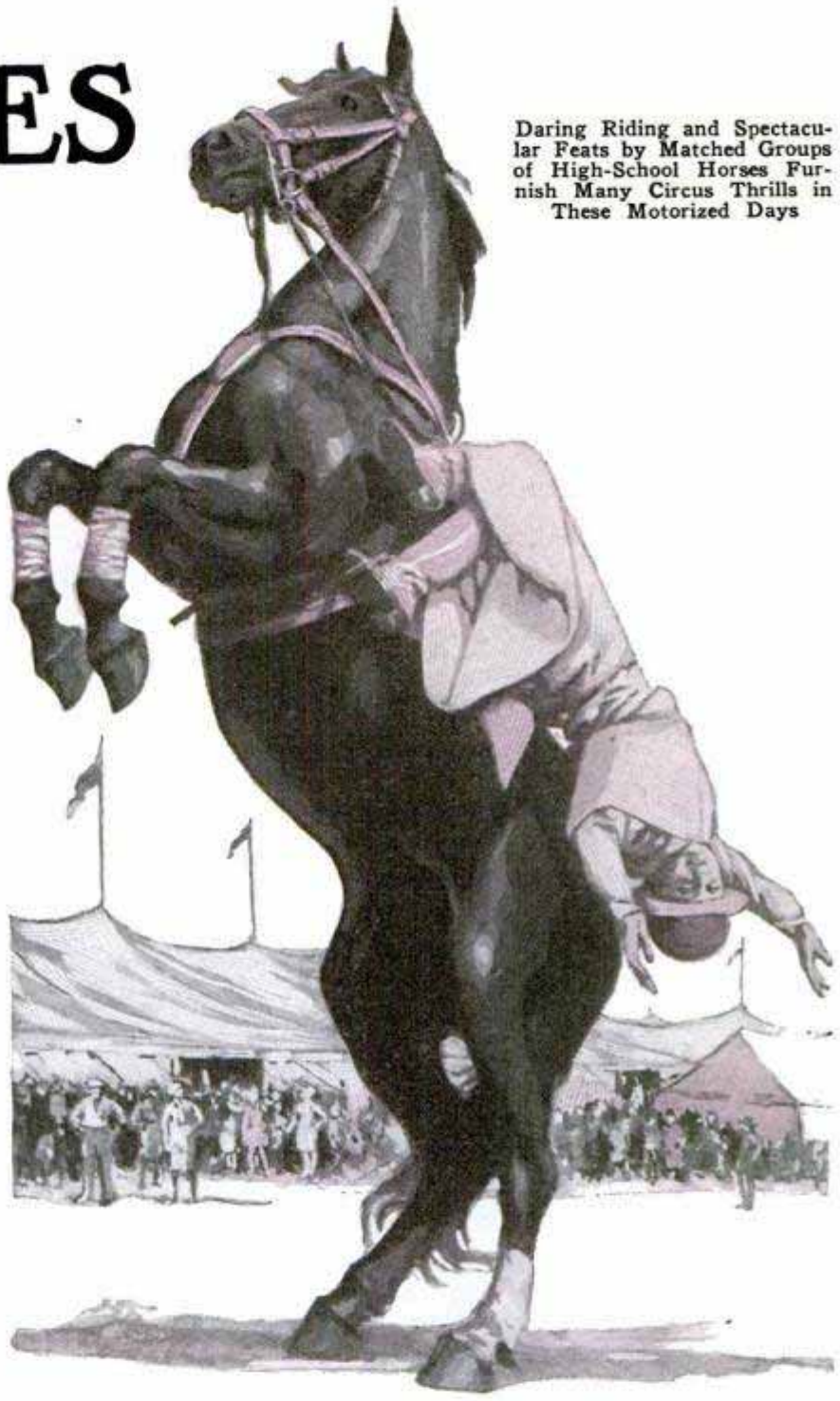
When an expert rider finds an untrained horse that looks good to him, that horse may be worth in a livery barn or on a farm $100 or may be less. But if its color and lines meet the rider's requirements, he tests it, first, for ticklishness. He digs his fingers into what, with human beings, would be the lower ribs on either side of the spine—the small of the back, as we would say. If the horse flinches or wrinkles up its skin, it means that it is ticklish and will not do, because the rider's feet "take off" and land on that particular spot.

The horse destined for circus life must be broad-backed because a rider not only has to stand on it, but must pirouette, or whirl, and even turn somersaults and must have a broad landing place. For a similar reason the horse's rump must not slope too abruptly toward the tail, or the rider, in "landing too far back," might not be able to keep his feet.

After a "green" horse is selected, the animal is given its first lesson out of doors. It is saddled and bridled and ridden a few

2984.

HORSES



Daring Riding and Spectacular Feats by Matched Groups of High-School Horses Furnish Many Circus Thrills in These Motorized Days

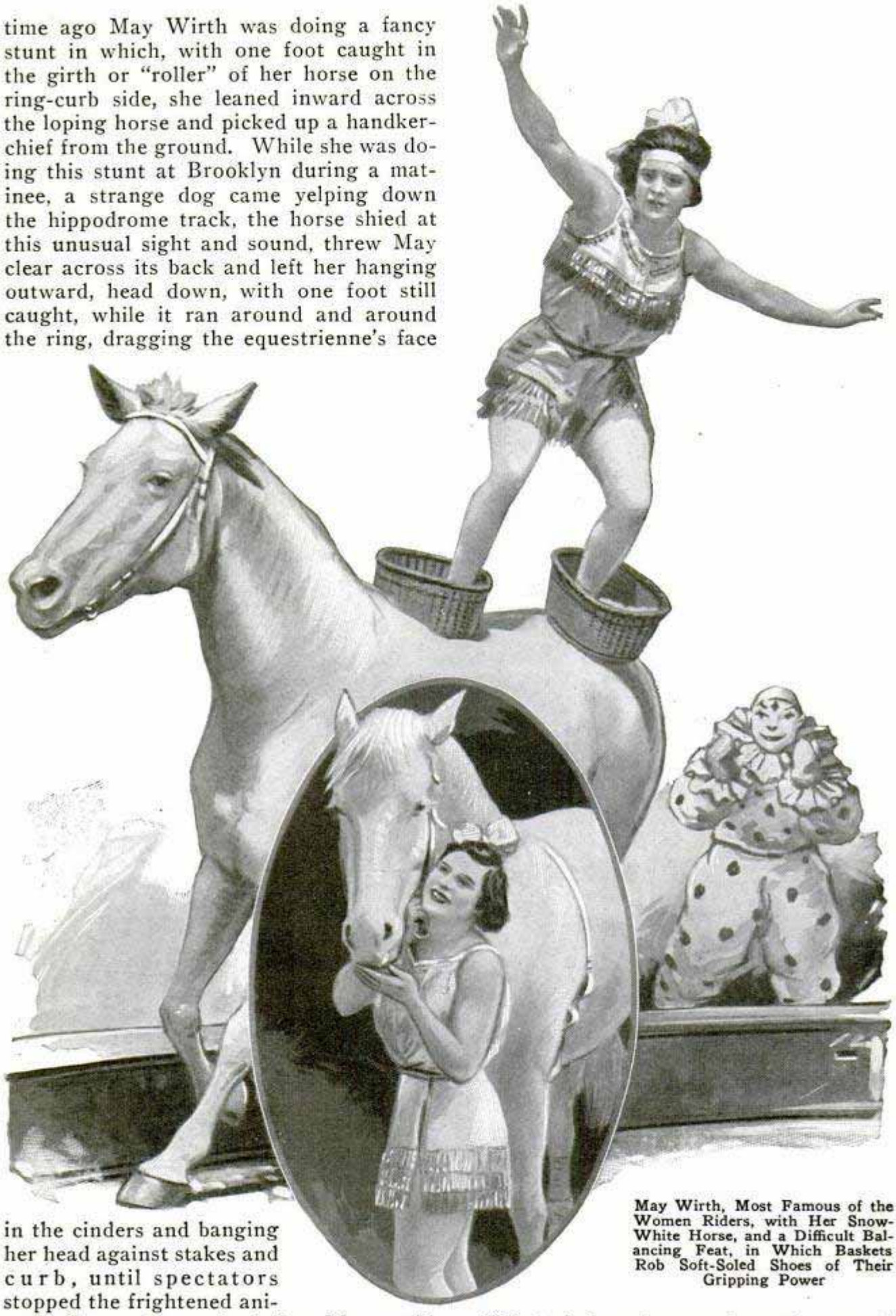
minutes daily for many weeks. Gradually its mouth is curbed, that is, its chin is pulled toward its chest if it is to be a principal horse, because curbing makes it canter best. But care is taken in curbing it, for sometimes a horse too tightly curbed will rear backward and break its neck.

Once thoroughly accustomed to close curbing and to the saddle girth and to the human weight on its broad back, the equine pupil is given a lesson under the roof of a big ring barn, but it is still saddled and bridled like any horse. During this second stage of breaking in, the animal is gaited, with the reins and bit, until it canters or lopes around the ring both ways.

In a principal riding act the mount and rider move from right to left. That is the way you see them when the band begins to play. But during the second stage of training the green horse, who is either gray or white, is also sent around in the ring in the opposite direction. This is to cure it of shying. Any normal horse soon gets used to the ordinary sights and sounds of circusdom, even to the presence of the elephants. After that, it only shies at the unusual or something it cannot readily see. In loping around the ring from right to left, its right eye takes in everything outside the ring, which is about the only place any unusual sight or sound can come from. But the left eye only gets an occasional glimpse of what may be happening in the world outside the ring. And at such a glimpse some horses may shy. So the well-trained ring horse is taught to see the outside world with both eyes, after which it goes back to the regular right-to-left loping inside the curb.

Circus riders try their best to prevent all shying, partly because, if a horse shies when the rider is standing on its back, the rider is certain to fall heavily. Even if the equestrian is nearer to the ground, a shying horse can do a deal of harm. Some

time ago May Wirth was doing a fancy stunt in which, with one foot caught in the girth or "roller" of her horse on the ring-curb side, she leaned inward across the loping horse and picked up a handkerchief from the ground. While she was doing this stunt at Brooklyn during a matinee, a strange dog came yelping down the hippodrome track, the horse shied at this unusual sight and sound, threw May clear across its back and left her hanging outward, head down, with one foot still caught, while it ran around and around the ring, dragging the equestrienne's face in the cinders and banging her head against stakes and curb, until spectators stopped the frightened animal. It was two weeks before May could ride again.



May Wirth, Most Famous of the Women Riders, with Her Snow-White Horse, and a Difficult Balancing Feat, in Which Baskets Rob Soft-Soled Shoes of Their Gripping Power

This training advances from the second stage to a third, during which the saddle is

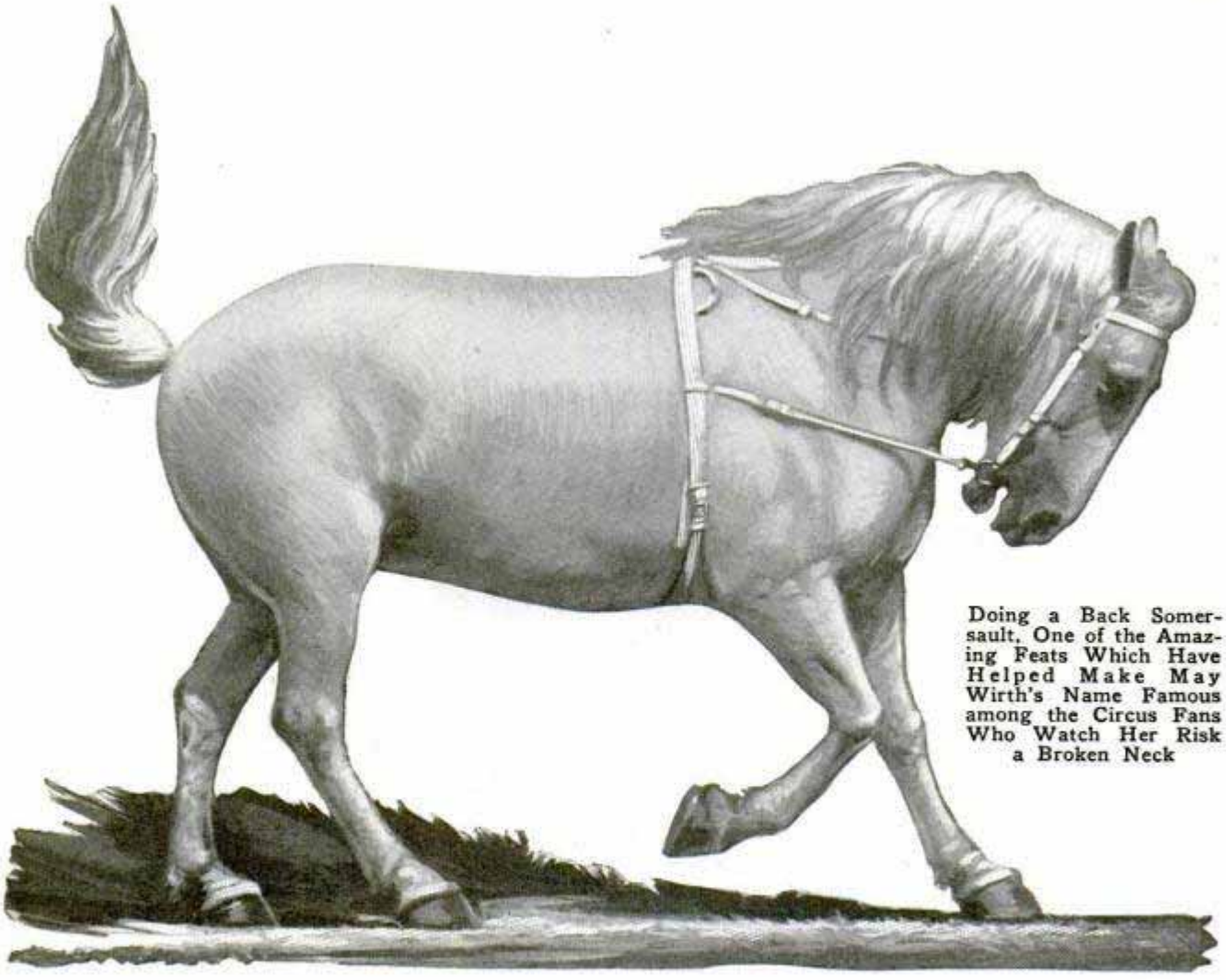
taken off, a roller, or broad leather girth with two handholds on the upper side, is buckled closely around the horse's belly, and a lunge rope is snapped into the bridle bit. The trainer holds the other end of this rope as he stands in the center of the ring and with a long-lashed whip urges the animal to canter or lope close to the curb. The whip is used sparingly, because much whipping ruins the spirit of any horse. As soon as the horse knows that the whip can sting, it is no longer necessary, except as scenery.

For quite a while the rider practices vaulting, aided by the handholds, from the ground to a sitting position on the loping horse. In time the rider assumes an upright position, then gradually works into pirouettes and somersaults. Usually, after the horse has learned to stick close to the ring curb and to lean inward to oppose the centrifugal force and to keep on going steadily, the lunge rope is discarded and the animal is permitted to go and stop only at the spoken word.

The Circus Blacksmith at Work, and May Wirth with Jules Turnour, the Circus' Oldest Clown

Until recently no principal act was complete without obstacles and "balloons." Some of the obstacles were hurdles—poles extending from the ring curb toward the center of the ring. The horse was taught to hurdle, usually while still working with saddle and bridle, just as any hurdle horse jumps in steeplechases. Having learned what hurdling meant, the principal circus horse hurdled automatically. Another kind of obstacle was the banner, or long and wide strip of colored cloth, under which the animal loped and over which the rider leaped. Six of these were held by banner holders, who stood on the ring curb. Half the success of the trick was in the manner of holding, by the banner men. They had to judge when the banner should be brought backward, to avoid the descending feet of the equestrian, for space and time are important in a circus-riding act. But the most important to all concerned was the training of the circus horse. A balk while the rider was in the air would probably break a human arm or leg. So the horse was first taught to lope beneath an outstretched hand, then a whip, then a slender pole, until the bright-colored banner didn't bother it.

The same process was followed with balloons, which are, to "towners," paper hoops. After the horse learned to lope under them, alone, the rider got upon the horse's back and, after many circles in this style, stood up and somersaulted through the hoops. Of course none of the results here touched upon were achieved as simply as this description sounds. Shy-



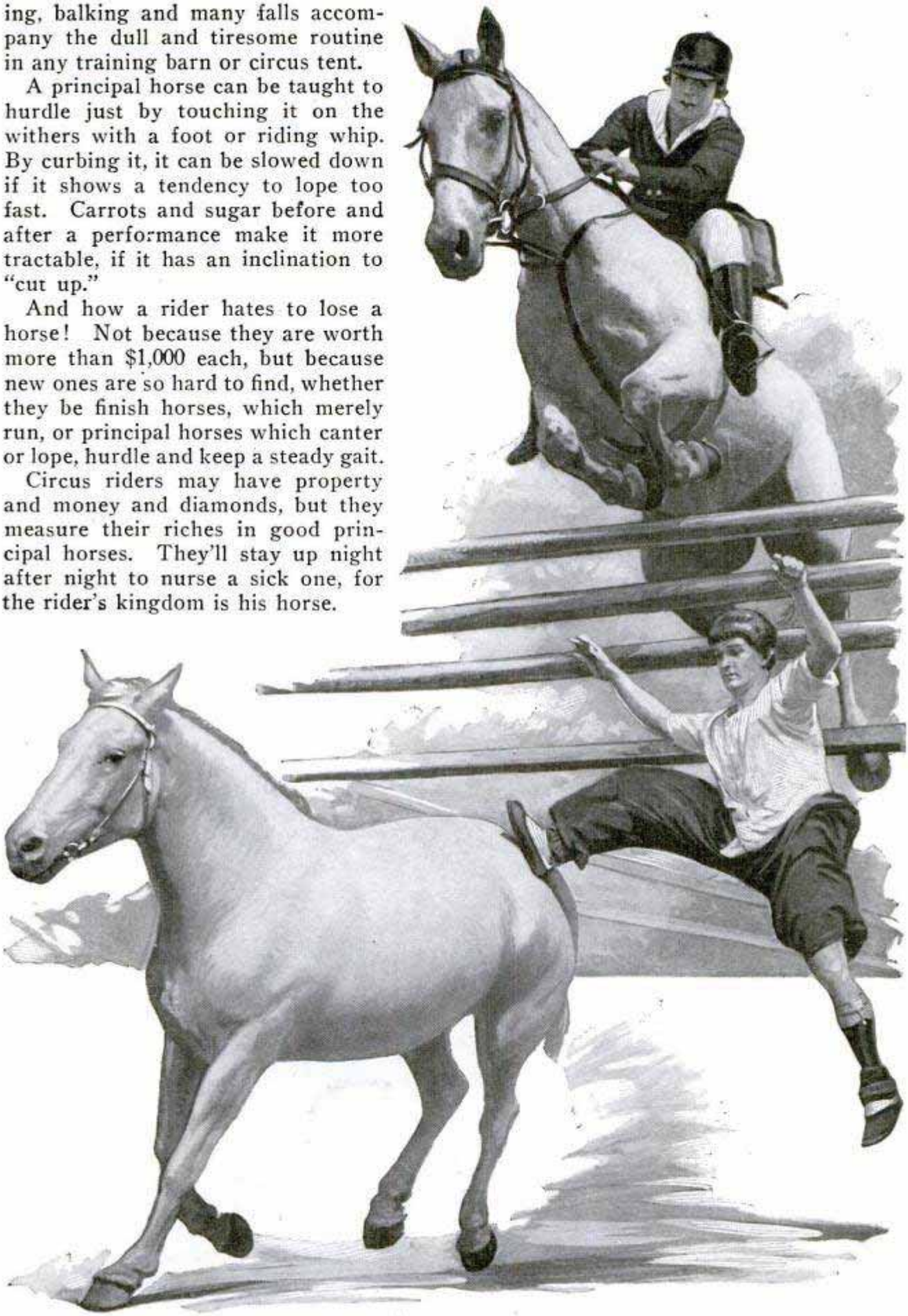
Doing a Back Somersault, One of the Amazing Feats Which Have Helped Make May Wirth's Name Famous among the Circus Fans Who Watch Her Risk a Broken Neck

ing, balking and many falls accompany the dull and tiresome routine in any training barn or circus tent.

A principal horse can be taught to hurdle just by touching it on the withers with a foot or riding whip. By curbing it, it can be slowed down if it shows a tendency to lope too fast. Carrots and sugar before and after a performance make it more tractable, if it has an inclination to "cut up."

And how a rider hates to lose a horse! Not because they are worth more than $1,000 each, but because new ones are so hard to find, whether they be finish horses, which merely run, or principal horses which canter or lope, hurdle and keep a steady gait.

Circus riders may have property and money and diamonds, but they measure their riches in good principal horses. They'll stay up night after night to nurse a sick one, for the rider's kingdom is his horse.



Phil Wirth Stepping off a Bareback Horse, and One of the Circus Equestriennes Taking the High Bars on a Trained Jumper; Circuses Have Always Been Famous for Their Fine Horses

Assembling Lumber Pieces in Convenient Shipping Package after Finishing with Special Saw

LUMBER SHIPPED IN PACKAGES TO SAVE WASTE AND TIME

Introduction of a special saw that cuts the ends of boards as smoothly as a plane finishes the sides, has made it possible to prepare and ship finishing lumber in packages. Each board is perfectly squared, saving handwork, eliminating waste and the substitution of inferior grades on the job. The package is made by slipping a fiber cap over each end of a group of three to twelve pieces. The saw is filed and set by a new method, the teeth are finer and the saw runs faster than ordinary mill equipment. Every tooth travels a true circle and does its full share of the cutting. The unit is operated by an electric motor and is simple to use. An additional feature of the package plan is that lumber is more quickly inventoried and handled more economically.

¶Tin may be reduced to dust by extreme cold.

TELESCOPE WITH GIANT LENS TO REVEAL NEW WORLDS

With the aid of the telescope, the camera has made approximately 1,500,000,000 stars visible on photographic plates, while but a few thousand can be seen by the unaided eye. Many more new spheres will probably be revealed with the constantly increasing size of the lenses of the giant telescopes used to sweep the skies. In the opinion of Dr. Francis G. Pease, of the staff at Mt. Wilson observatory, a telescope with a twenty-five-foot lens is not impossible in view of the increasing improvements in glass making and grinding. The mirror of the present telescope there is 100 inches in diameter. A twenty-five-foot lens instrument would cost at least $9,000,000, he says, and an endowment of $3,000,000 would be needed for its maintenance and operation, while a special location would have to be found for it to escape atmospheric difficulties arising from searchlights in the neighborhood. One of the troubles with the big reflecting mirror of the present telescope is that it bends in the heat of the sun.

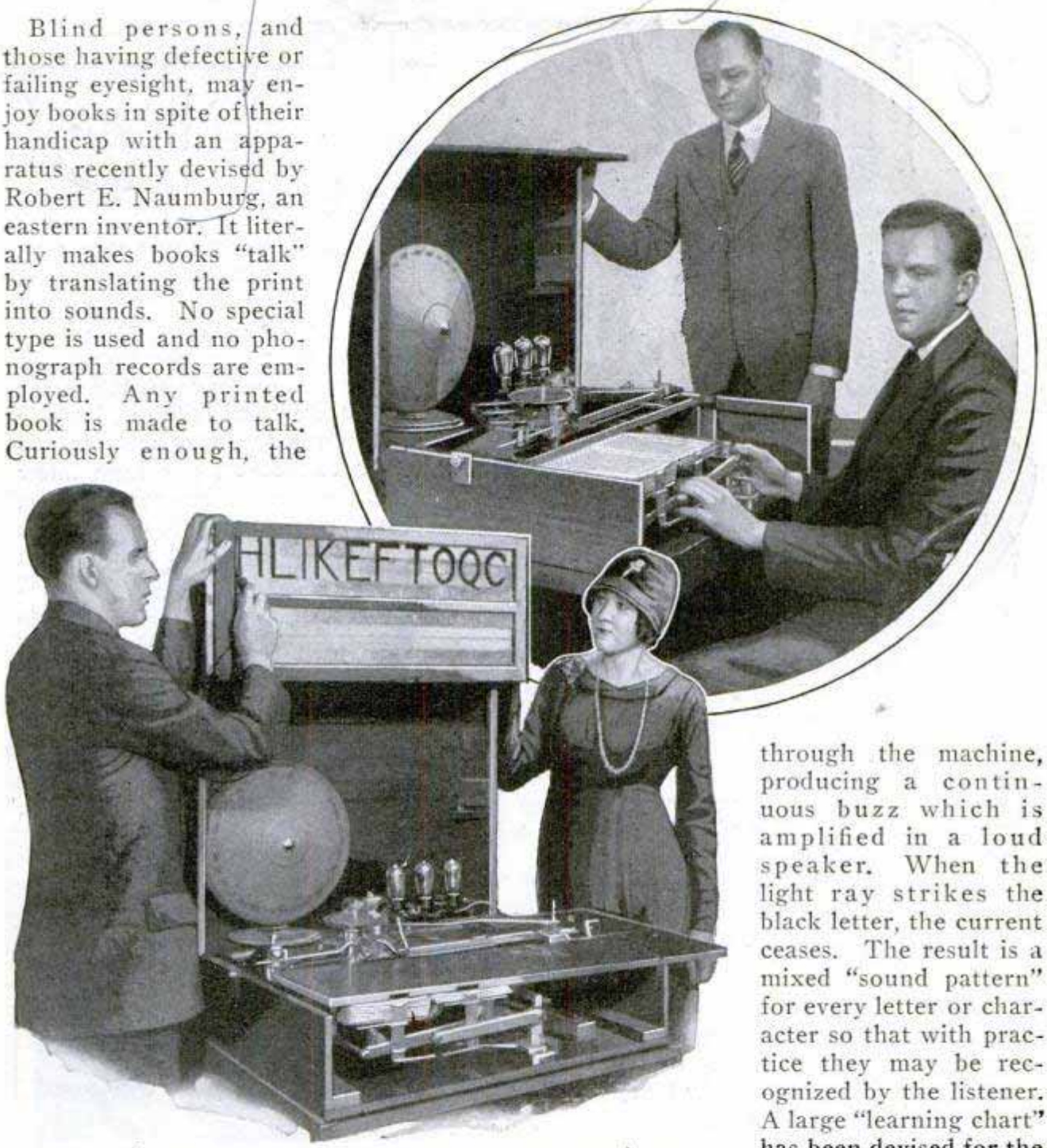
WIRE-CARPET CONCRETE FORM IMPROVES CEMENT FLOOR

As a combination form and reinforcing material, a steel-wire mesh, with specially constructed backing, is suitable for cement floors, stucco and plaster. It is said to save concrete and eliminate the need of wood or metal forms, act as insulation against sound and to increase the strength of the cement, as it helps retain the original amount of water, thus insuring better curing. The fabric is quickly placed over the joists for laying the floors, as it comes in conveniently handled rolls. It is also suitable for use on roofs.

Applying the Wire Carpet as Reinforcing for Concrete Floor; It Also Serves as Insulating Material

ELECTRIC PAGE MAKES BOOKS "TALK" TO BLIND

Blind persons, and those having defective or failing eyesight, may enjoy books in spite of their handicap with an apparatus recently devised by Robert E. Naumburg, an eastern inventor. It literally makes books "talk" by translating the print into sounds. No special type is used and no phonograph records are employed. Any printed book is made to talk. Curiously enough, the talking is done only where blank spaces occur on the pages.



Above, Mr. Naumburg Giving a Lesson in Reading on the "Talking-Book" Machine to Toivo Laminan, and, Below, Student Showing Mrs. Naumburg How Letters Are Recognized on the Panels

The instrument combines principles of the radio, the light-sensitive cell and the televisor. A book, in ordinary print, is placed in a special holder and a tiny ray of light is directed on the page, the apparatus being adjusted so that it can be moved along each line of print. As long as the beam of light is shining on the white paper, an electric current flows through the machine, producing a continuous buzz which is amplified in a loud speaker. When the light ray strikes the black letter, the current ceases. The result is a mixed "sound pattern" for every letter or character so that with practice they may be recognized by the listener. A large "learning chart" has been devised for the use of a pupil or student of the system, through which he can himself reproduce these patterns by mechanical means.

HONEYCOMB FIFTY FEET LONG FOUND IN HOUSE WALL

Workmen repairing a house in Stockton, Calif., not long ago, found a honeycomb fifty feet long inside one of the walls. It extended from the ground to the roof and was a mass of bees and honey.

640

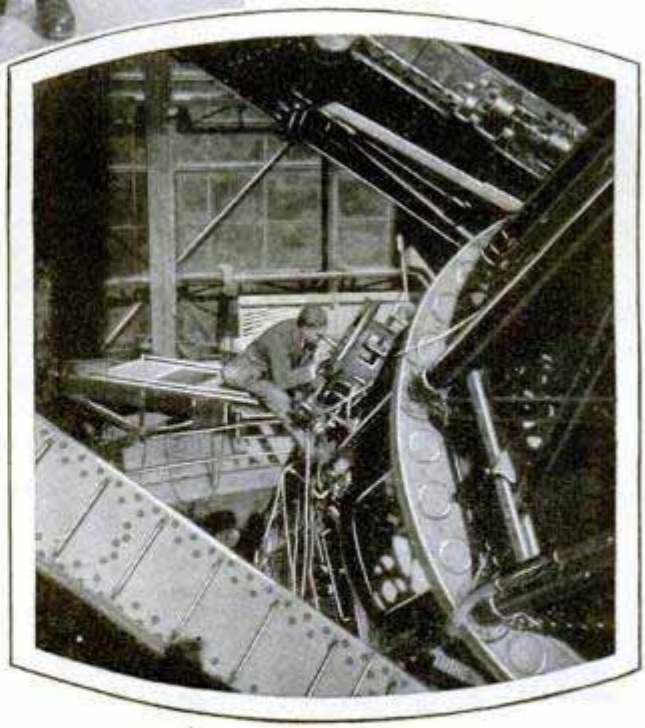
The Latest Mystery

Not many years ago, the phenomenon of a new star would have caused wide concern. The splitting of a heavenly body would have struck terror to the hearts of millions, but the astronomers went calmly back to their telescopes, for they knew that the break, whatever its cause, would not affect the earth—that it actually happened many years ago, anywhere from 300 to 1,000. Nova Pictoris is so far from us that it has taken light, speeding here at the rate of more than 186,000 miles a second, centuries to reach us. The split was a new and wonderful discovery here, but to the heavens, it long had been a matter of history.

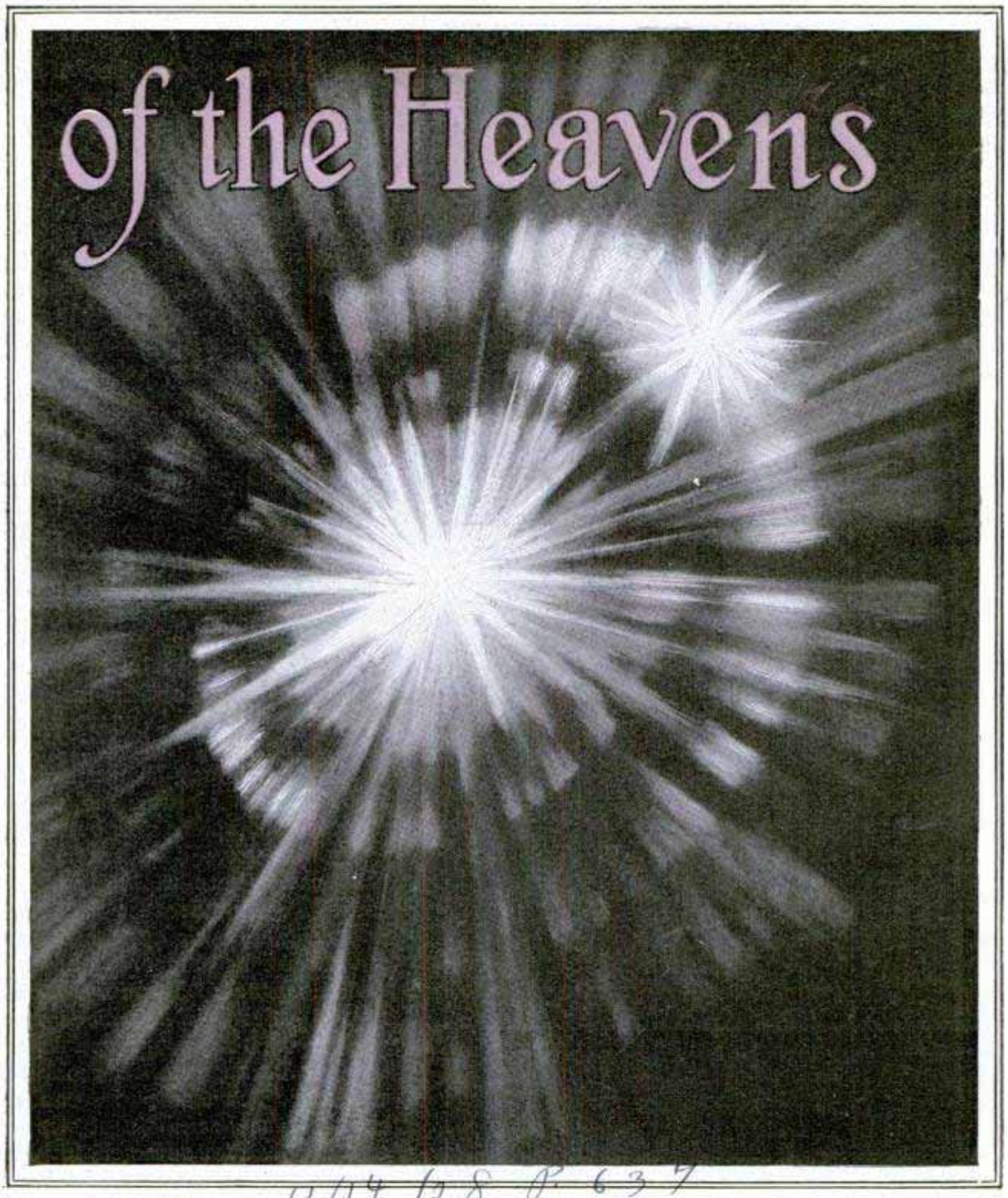
By PAUL PADDOCK

ASTRONOMERS, peering through a big telescope in Argentina recently, discovered the latest mystery of the heavens. "Nova Pictoris," a new star, found in 1925, had split in two. Word was flashed to the Union observatory in Cape Town. Scientists there trained a twenty-six-inch glass on the star. They, too, saw the wonder.

The spectacle was without precedent. The breaking of a star has never been seen before, according to Dr. W. H. Steavenson, president of the British Astronomical association. New stars like this appear from time to time, five having been observed in the last ten years. They flare up suddenly, glow with intense brilliance, may be for but a few hours, and then subside or disappear.



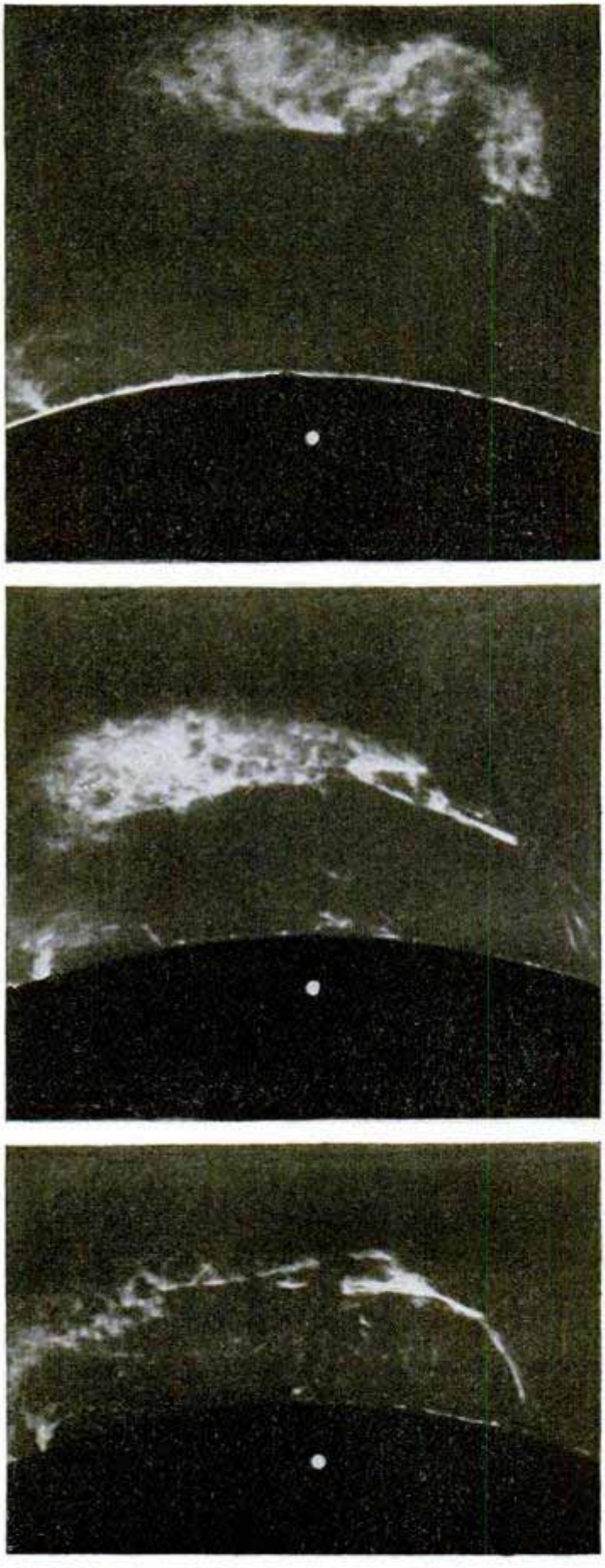
Mr. Lee Taking Spectroheliogram of the Sun at Yerkes Observatory, and F. G. Pease at Mt. Wilson's 100-Inch Reflector Telescope



© The Illustrated London News

Hundreds of Years Ago a World Blew Up, Probably after a Collision of Two Suns, But the News Just Reached the World When Astronomers Saw the Star Nova Pictoris Split in Two

"The skies are filled with mysteries as baffling as that of the new stars," said George C. Blakslee, who supervises the photographic work at Yerkes observatory. "One of the first impressions we gain of the heavens is a sense of the enormous distances involved. They are incomprehensible, but comparisons help to grasp them. We are living in a day of rapid travel. Suppose we wanted to take a trip into space in an airplane and the journey were possible. Flying at the rate of 200 miles an hour, night and day, it would take us six weeks and five days to reach the moon, fifty-four years to get to the sun, and 13,329,625 years to go to the nearest star. It takes light four years to reach us from this star and forty years



A Mystery Eruption on the Sun, Which Was Observed While Taking Photographs of It in 1919; the Flaming Canopy Rose to a Height of 410,000 Miles; Dot Shows Comparative Size of Earth

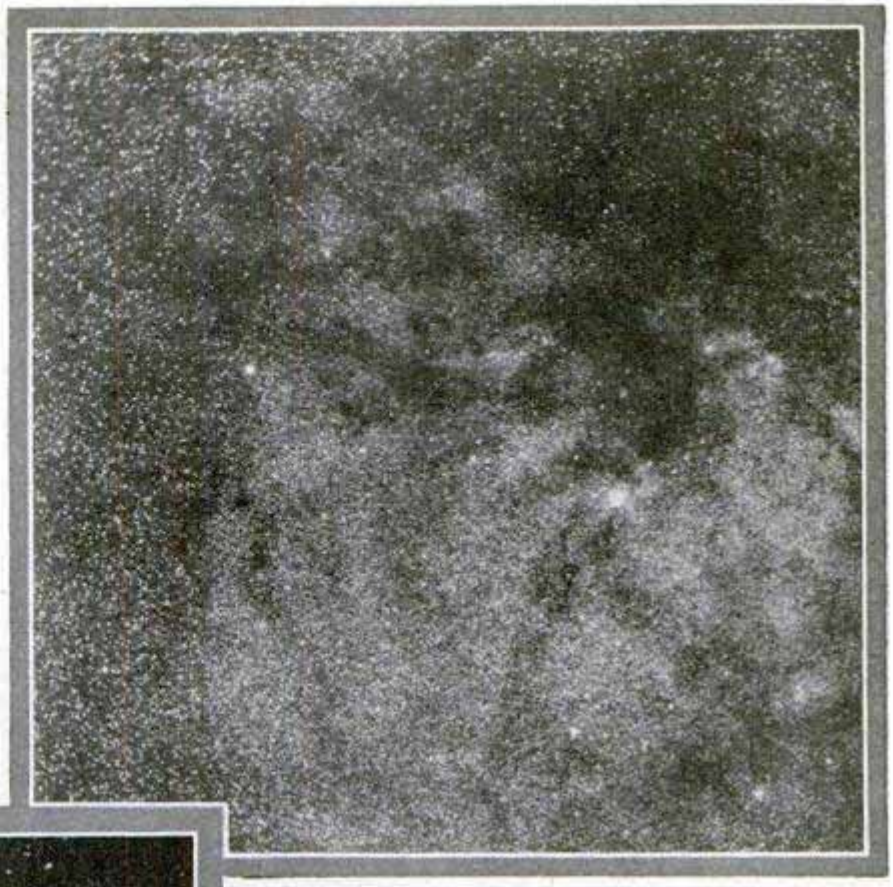
from the Pole star. The light you see tonight from Orion, started at about the time of the Crusades.

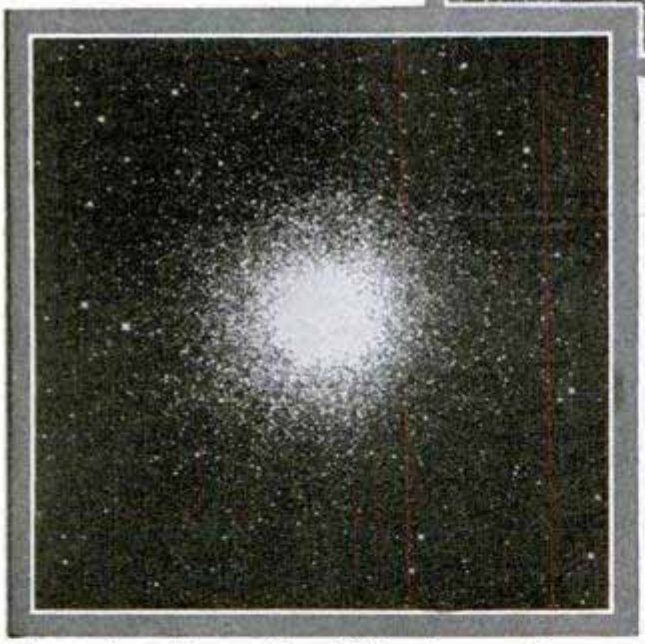
"Millions of stars are so far away and the light from them is so faint, that the unaided eye can never see them. The telescope has pushed the frontiers of the heavens back far beyond the dreams of the earliest astronomers, but we owe a debt almost as great to the camera. Astronomy is one of the oldest sciences, but star photography is of comparatively recent birth. You might say that it had its beginning with the introduction of the dry plate. Prof. Henry Draper, of the University of New York, made the first successful star photograph in 1840. A year later, at the Harvard observatory, a picture was made of the moon. It was considered so wonderful that it was exhibited throughout the east and then taken to the Crystal Palace in London.

"Today we may be inclined to smile at this picture, for many far more complete and better in every way have been taken, but these early photographs are of inestimable value because they give us a tangible basis by which later studies can be compared and any changes noted. Taking pictures of the stars is a laborious and highly exacting procedure. For one good plate, hundreds may be failures. The star photographer endures the hardships of winter and the heat of summer, for his observatory dome must be kept as near as possible to the temperature of the outside air to preserve the accuracy of his instruments and so as not to distort the vision. Negatives must be developed with the utmost care and precision to insure accurate reproduction of every detail. The big telescopes must be nicely focused and kept in constant adjustment to compensate for the rotation of the earth. This is ex-

ceedingly important when long-time exposures are made, and practically all star photography falls in this class. A single plate may be exposed for hours and sometimes on two or more nights in order to record far-distant stars. Giving long time enables the camera to 'see' for us thousands of stars that our eyes could never detect. The faint rays of light keep 'tapping' away on the plate until they make their little mark, a dot that shows a star."

Imagine a camera weighing twenty tons, with a



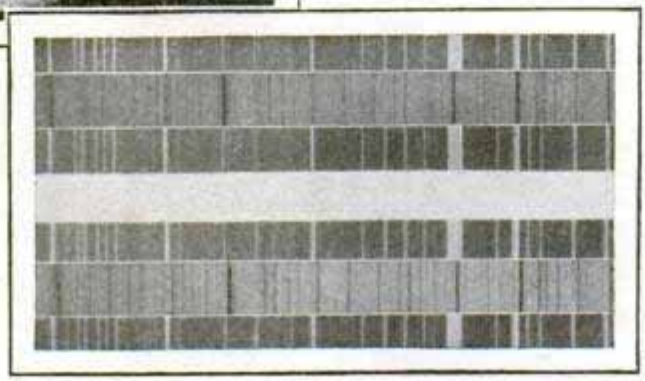


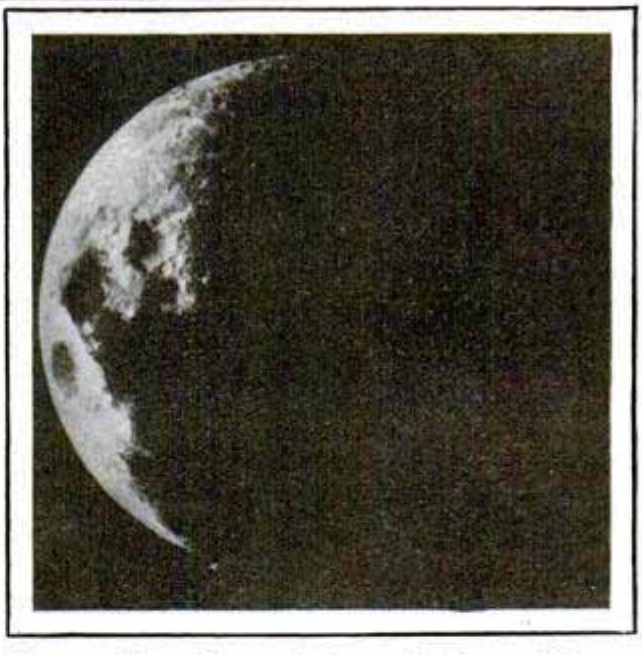
Above, Star Cluster of a Million Suns as Large as Ours, and a Three-Night Exposure of Hercules Cluster from Negative Taken at Mt. Wilson

lens forty inches in diameter which weighs a little less than 1,000 pounds, with a focal length of sixty-three feet, that can be extended nearly ten feet when special attachments are used, and you have an idea of the giant refractor telescope at Yerkes observatory as it is used for photographic work. In spite of its tremendous weight, the long six-ton tube is so delicately adjusted and balanced that it can be moved with one arm, but, in operation, it is focused electrically with accurate indicators. One of the most important features is the clockwork mechanism which corrects the position of the telescope with reference to the rotation of the earth. Its gears keep the big glass pointed exactly on the star, regardless of the earth's turning. But in addition to this mechanism, an assistant always works with the observer when a star photograph is being taken to keep the telescope aimed with perfect accuracy, according to guide lines on one of the eyepieces.

In winter time, astronomers and star photographers at Yerkes observatory frequently have to dress as warmly as polar explorers. Temperatures of thirty degrees below zero, and colder, are not uncommon in the big dome that rolls about on wheels so that any section of the sky can be exposed to the glass.

The forty-inch telescope is used for photograph work more than for direct-vision purposes. Smaller lenses, including a six-inch glass that can be quickly moved about for hunting comets, are favored for ordinary observations. To make a star photograph, the plate holder is carefully adjusted to the lower end of the big telescope, thus transforming it into a camera. Two interesting attachments are used for making special photographs of the heavenly bodies. They are forms of





Contrast Upper Photo of Moon with Lower, Taken in 1841, the Oldest Astronomical Photograph; Center, Spectrogram of a Star

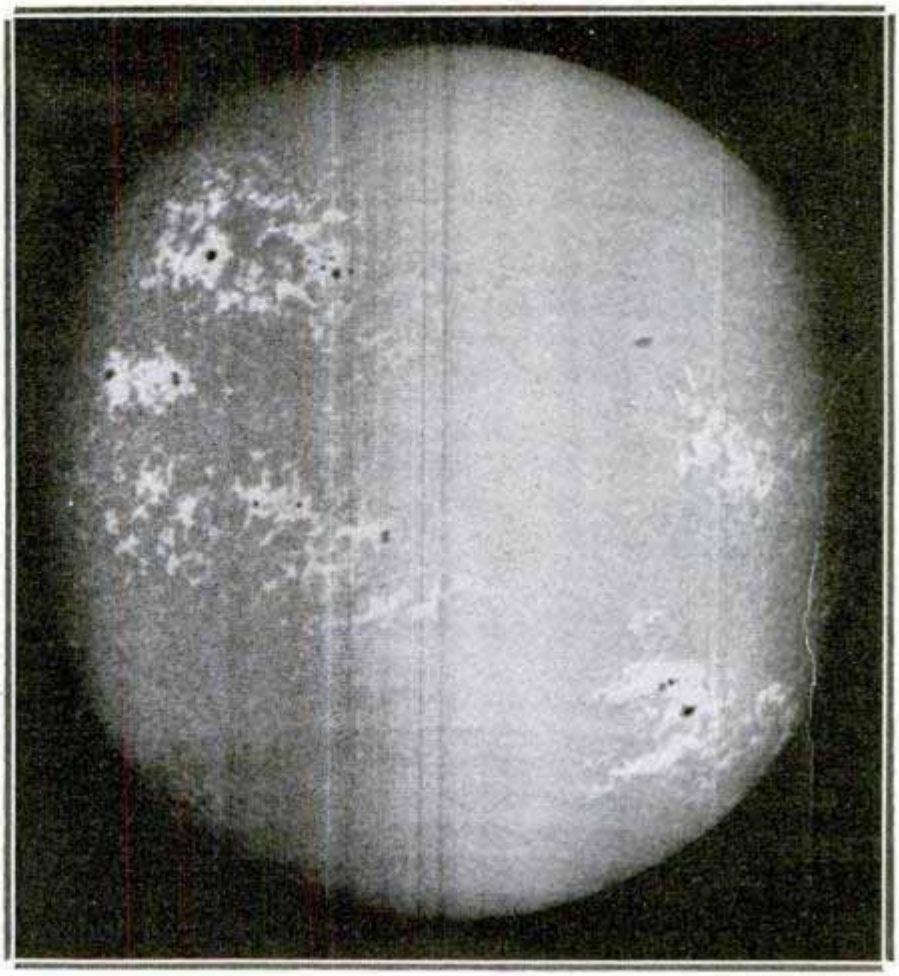
the spectroscope, an instrument which splits light into its different elements. The spectrograph makes such a light picture of the star. It shows the body, not as a round object, but as a curious pattern of dark and light lines. By studying these marks, the astronomer can tell what materials are in the star, whether the body is new or old, whether it is going toward or from the earth and about how fast. Similar light studies of the sun are made, for this is the time of the maximum sunspot cycle, a phenomenon that occurs once in every eleven years or so. At least five spots can be seen with the unaided eye by looking at the sun on a clear day through a piece of smoked glass.

"The camera may help clear up some of the mysteries of these sunspots," Mr. Blakslee continued. "We know that they are forms of electrical cyclones of tremendous intensity and size, and just now, they are of special interest to us, for we are trying to find out what connection they have with weather conditions here on earth. We know that they have an effect on the northern lights and these, in turn, cause atmospheric disturbances. Not long ago, many telegraph lines were out of commission for a short period during an unusual activity of the lights, and practically every radio fan knows that the lights disturb the sending and receiving of messages. Quite recently an organized effort has been started to learn more of the effects of these spots. Observatories in this country and in other parts of the world are taking pictures of the sun in connection with careful weather observations. By comparing all the facts obtained, we may have a much better basis on which to make long-range weather forecasts. For instance, if it is found that world weather changes with the sunspot cycle, these changes may be predicted in eleven-year intervals, for that is the duration of the spot period. They increase in number for about eleven years, reach a maximum and then subside until another 'outcropping' of spots in great number occurs eleven years or so later.

"One of the most remarkable of the sun pictures was taken by Prof. Edison Pettit, in May, 1919. It was at a time of the maximum spot cycle and he had noticed a peculiar cloud hanging above the sun. The next day, he concluded, something unusual would happen. He was right. With the assistance of his wife,

he took sun pictures as long as he could. He was richly repaid. One of the most curious happenings ever recorded was preserved for all time on his plates. A huge, flaming canopy suddenly rose far above the sun, dipped and rose again and, finally, when it had reached a height of 410,000 miles, it vanished. Photographs the next day, showed not a trace of the strange specter. It doubtless had some connection with the sun-spots, but no one knows just what caused it, where it went or what it was.

"In recent years, star photography has become of still further importance through the introduction of plates that are sensitive to the infra-red and ultraviolet rays. The infra-red are long rays that penetrate mists and fogs, revealing what is behind them, so that, with their aid, we may be able to pierce the shrouds of mystery that hang about some of the planets. The short ultraviolet rays reveal details that cannot be registered in ordinary light. We are learning more about Mars by means of special photographs of this kind. Opinions differ as to whether there is life on Mars at the present time. It seems wholly probable to the astronomer that there are thousands, perhaps millions, of bodies out in space that do support life in some form. At least, it is difficult to believe that our globe is the only abiding place of life, when the heavens are filled with bodies, millions of them many times larger than our earth."



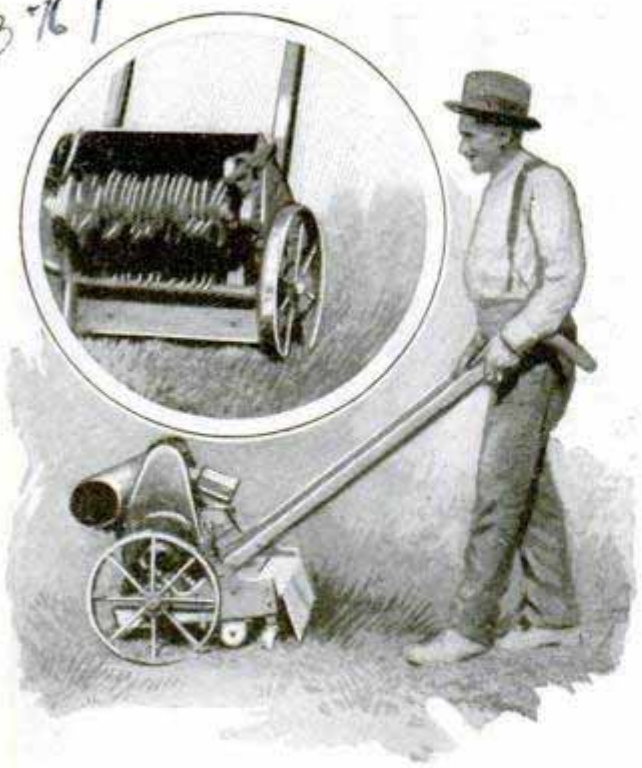
How Sun Appeared April 12, This Year, through Yerkes Observatory Telescope; a Maximum Spot Cycle Is Now at Its Height

WEED LEAVES LIKED AS FOOD IN EASTERN MARKETS

Leaves from the early blooming mustard, a weed that grows in abundance in California, are shipped to the eastern markets in fancy cartons and sold for greens. Pickers are sent out through the fields in late February, when the plants have matured sufficiently, to gather the leaves, which are graded according to size, packed in small boxes lined with oiled paper and shipped in cracked ice with other perishables.

MUD CLAMPS FOR AUTO TIRES PREVENT GETTING STUCK

Quickly clamped to the rear automobile tires, a pair of metal hooks afford traction when the car sinks in a mudhole or other soft spot. They do not injure the rubber, will not come off and help lift the automobile out of the mire. The clamps are made for both balloon and small tires and are easily carried in the repair kit.



Treating Lawn with the Renovator, and Close View Showing the Arrangement of Rotary Cutters

RENOVATOR TO CLEAN LAWNS REDUCES HAND RAKING

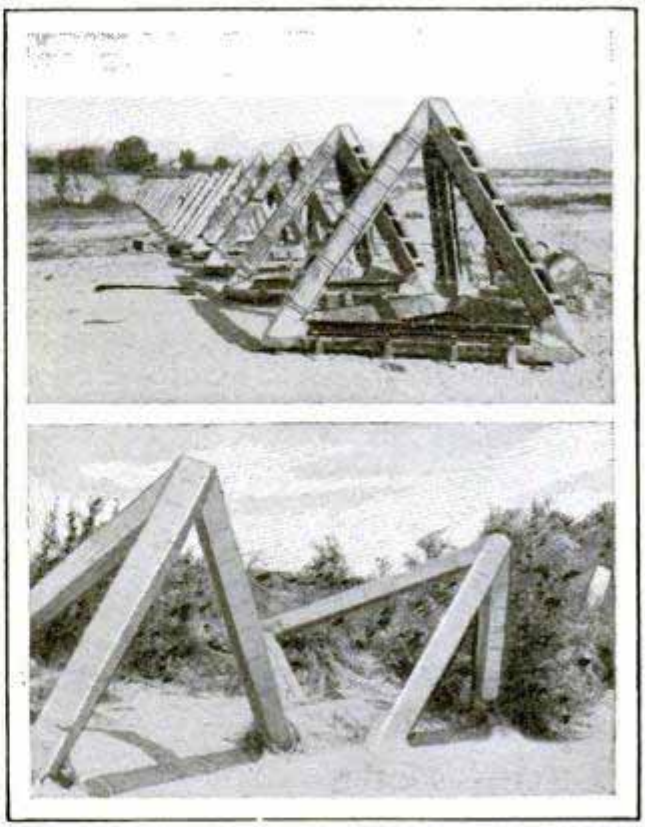
Clumps of foreign grasses that endanger the lawn are easily broken up and the soil loosened or prepared for further seeding with a motor-driven renovator now on the market. It has a group of rotary cutters which can be raised or lowered according to the depth of the cut desired and are propelled by a small gasoline engine. The unit raises the runners of some of the grasses so they can more easily be cut with the mower, breaks up the crust and stimulates the growth of the desirable planting by cultivating the ground.

RICH AMBER MINE GIVES WORK FOR ENTIRE VILLAGE

Nearly everyone of the 800 inhabitants of Palmnicken in Prussia is employed in the amber mine there, said to be the only plant of its kind in the world. The spot has been famous since the days of the ancient Phoenicians, when amber was used in trade. It was usually dredged up by fishermen along the Baltic coast, but recently has been dug out of the blue clay. The mine yields nearly 125,000 pounds annually, but only about one-half of it is suitable for beads and ornaments. The rest is ground into powder to make pressed amber or is melted and distilled for other products. The most valuable pieces bear the name of "sauerkraut" amber because of their pale-yellow tinge and the markings suggesting strands of cut cabbage. The material is found in a wide variety of shades, and many pieces contain the preserved bodies of insects, which became imprisoned in the sap of the coniferous forests that flourished here thousands of years ago. It is this sap, in petrified form, which is so highly valued as the amber of today.

SEVEN-TON CONCRETE BRACES HELP CURB FLOODS

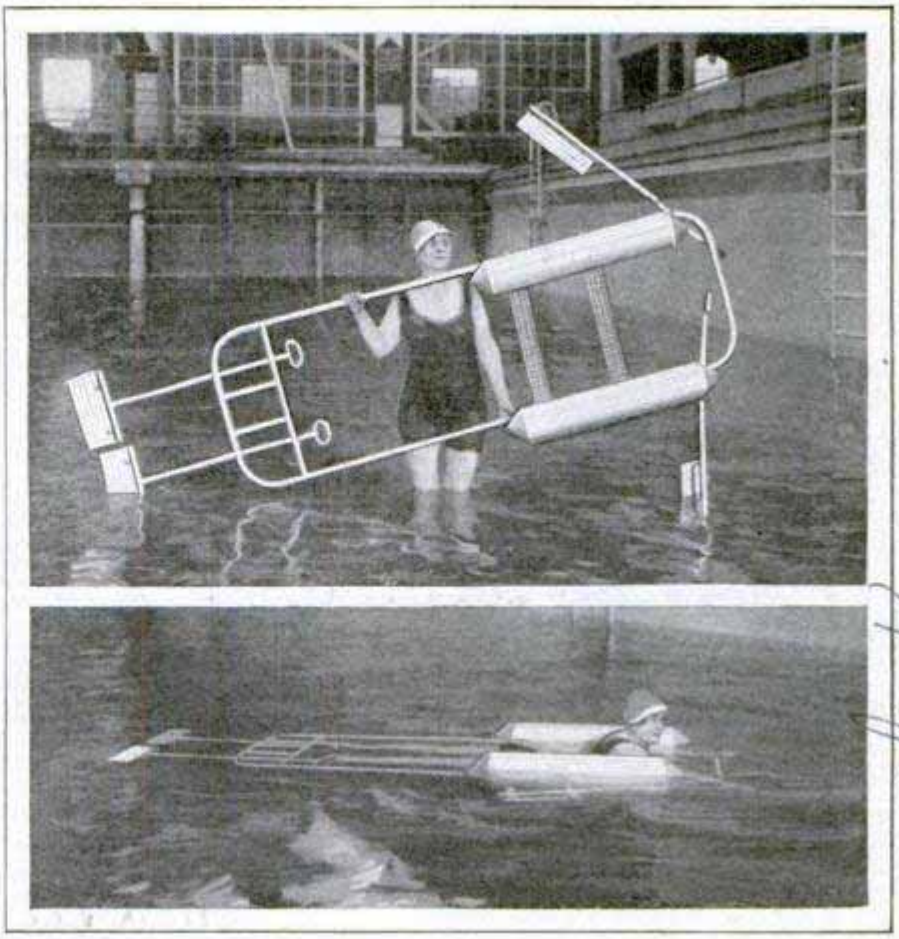
Concrete braces in the form of a three-cornered pyramid, each thirteen feet high and weighing seven tons, are effectively used in California to strengthen the banks of the Santa Clara river during flood times. The chief advantage of the units is that, even if they tip over, they offer a barrier, as a broad base is exposed regardless of how the skeleton falls. Driftwood lodges against a row of the units, gradually silt and sand accumulate and, in time, this embankment, made secure by the concrete braces, forces the river back to its old channel.



Concrete Braces Used to Collect Dirt and Brush and Help Stop Floods; They Are Difficult to Upset

NEW HELIUM PLANT FOR MILITARY DIRIGIBLES

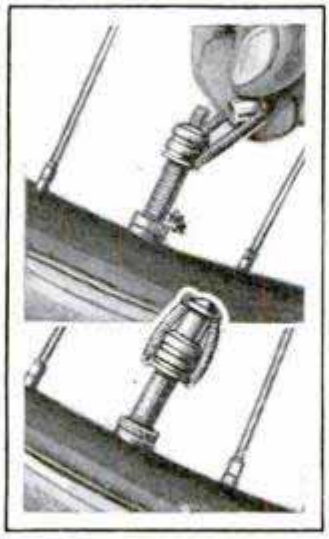
To insure a constant supply of helium, the non-inflammable gas used to inflate the bags of lighter-than-air craft, the bureau of mines has closed a contract for the establishment of a large plant in Potter county, Texas. It is proposed to extract the helium from the natural gas in the region, cooling it to 300 degrees Fahrenheit below zero so that all its constituents except helium are converted into liquids. The valuable gas will then be drawn off and compressed in tank cars or steel cylinders for shipment. The remaining liquid will be restored to a gaseous state for use in heating and other purposes. After the natural gas has gone through this process of extracting the helium, its qualities as a heating agent are said to be appreciably improved.



Showing How Easily the Swimming Skiff Can Be Lifted, and the Unit in Use; Note the Foot Paddles

SPRING TO HOLD VALVE CAP PREVENTS LOSS

Quickly removed or replaced, a tire-valve cap, used in Germany, is held by a spring so that it cannot drop off when taken from the stem. This saves time while inflating tires and also keeps the cap from becoming dirty, as usually happens if it falls to the ground.



SWIMMING SKIFF SAVES LIFE AND AFFORDS SPORT

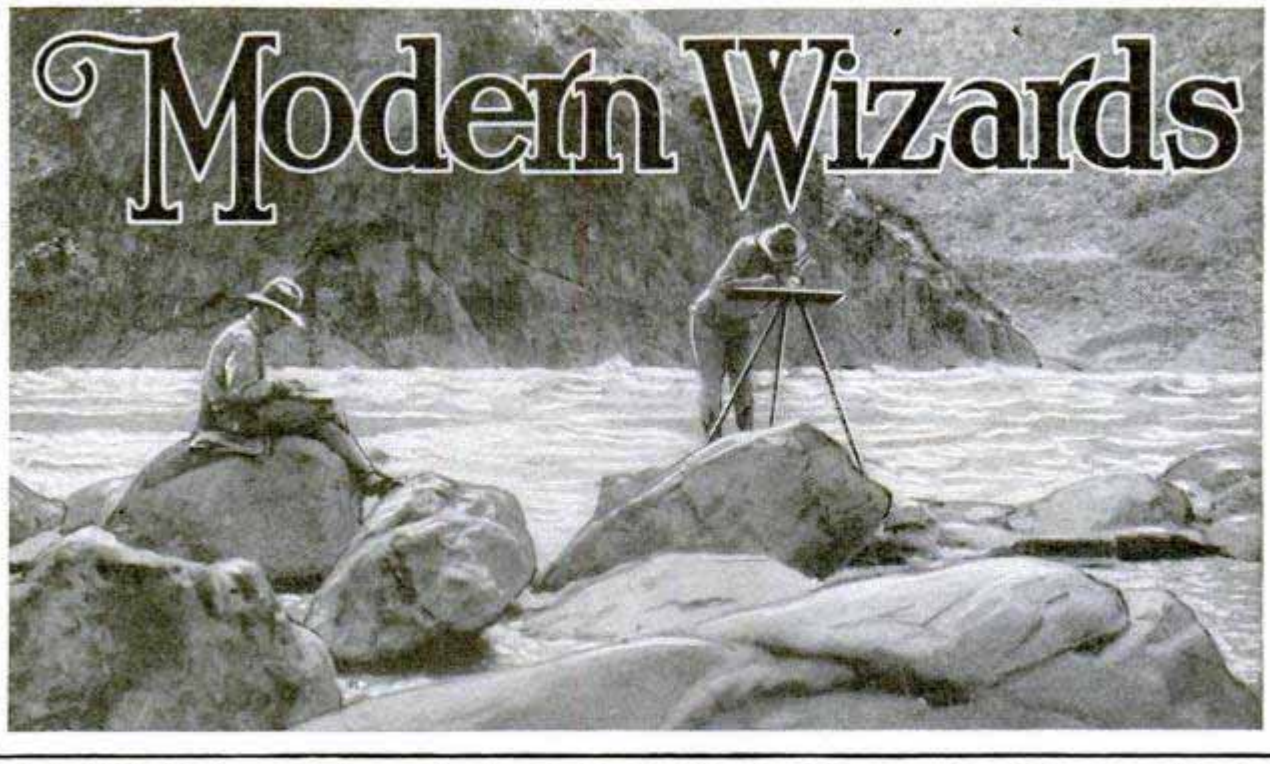
Supported by special floats and propelled by means of paddles, worked by the hands and feet, a light-weight skiff has been introduced as a life-saving unit and to provide sport in the water. It is easily managed, a number of them can be stored in small space, and considerable speed can be developed. When lying on the skiff, the operator's head is well out of the water.

LIGHTING FOR FIFTY HOMES IN GIANT ELECTRIC BULB

Three feet high and twelve inches in diameter, a huge bulb for airport lighting and other special purposes, produces illumination equivalent to that needed for fifty average homes, officials of the General Electric company report. It will have a life of 1,000 hours, while the thirty-kilowatt power bulbs already in use, have an average life of but ten hours. To prevent melting of the glass, a chimney has been fitted on top of the lamp.

¶Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information.

Modern Wizards



U. S. Geological Survey Engineers Charting the Depths of the Grand Canyon of the Colorado, to Map the Possibilities of Utilizing Its Potential Five Million Horsepower

By JAMES NEVIN MILLER

WATER inspires the something like seventy-five engineers of the geological survey into a series of daily adventures that would make well-nigh any movie-stunt man envious. Within the space of a few weeks, they may be called upon to suspend themselves from a cable car above a raging torrent; dig holes through ice of sizable thickness so as to measure a stream's velocity; penetrate the ultra-arid regions of the great southwest, or risk their necks while surveying in the vicinity of rocks that tower hundreds of feet above the water level.

Bear in mind that these are typical, not unusual, cases. For practically all the survey's engineers are field men, worshiping the very name of water—the greatest of all the world's needs. Quenching thirst, offering transportation and power, transforming arid wastes into bountiful fields, it spells health, prosperity and progress to every one.

Veritable wizards in ingenuity, quick-fire judgment, inventive skill and action are these men. They must be, for theirs is the man-sized job of supplying the entire nation with reliable data regarding our water supply. Millions of dollars annually are saved, directly or indirectly, through their efforts. Records already collected have been the basis of most irrigation projects in the west; of modern development of power, both hydro and steam; of water supplies for cities and industries, and of studies for sanitation, drainage, flood control and navigation.

Located at strategic points along the edges of our major streams are about 1,800 measuring stations, devised to probe conditions of surface water—that is, the velocity and average rate of flow of our rivers. Each station is a good-sized concrete hut or shelter. Ordinarily it contains the following standard equipment: a steel cable—to be stretched above the stream from points along the shores—and a car that runs along it and into which the engineer may go when the occasion demands; and two ingenious devices, perfected after long years of study—the water-stage recorder and current meter.

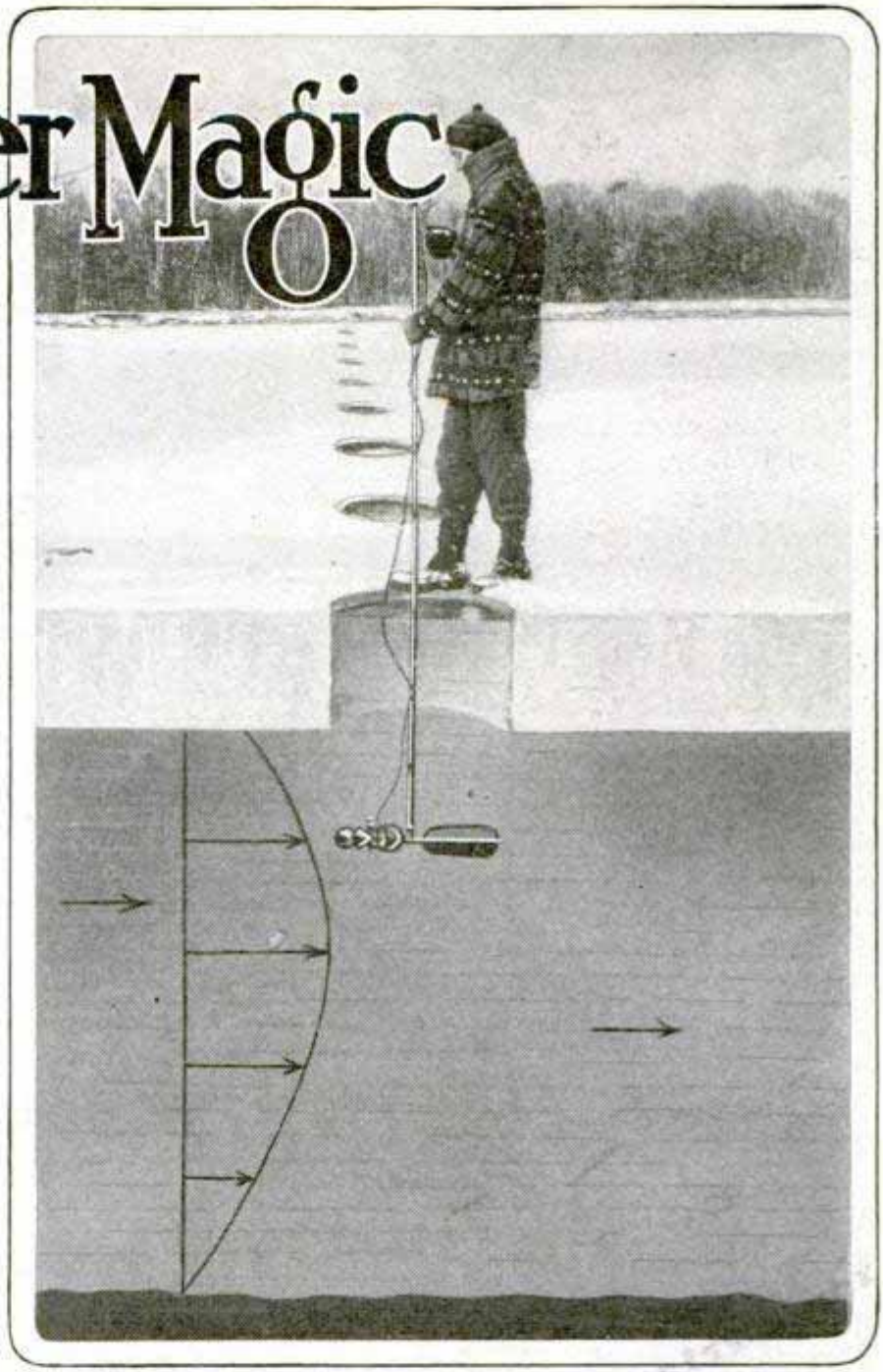
The recorder is a permanent fixture of each station, being installed within the shelter over a well connected with the waterway whose surface is to be measured. The newest type shows the fluctuations in stages of the stream by means of a graph from which the height of the water at any time may be read. As for the cur-

5 90

# of Water Magic

rent meter, its purpose is to measure the velocity of a given stream, and this may be done by the observer in two ways, either by suspending the device by wire from the cable car, in case the stream is deep or violent, or by dropping it from a rod. It consists of a wheel, containing five cups, which revolves upon impact with the flowing water.

On impressive streams, such as the Colorado, where depths as great as fifty feet and velocities up to fifteen feet per second must be measured, using the water meter becomes hazardous. In such case no less than a hundred pounds of lead are necessary to hold the meter in proper position against the torrent, and cables as long as 1,500 feet must be used at dangerous points. Though the observer's perch may be lofty, and therefore seemingly exempt from dangerous risks, he is liable at any moment to be jerked from his position by the terrific impact of floating logs and other drift against the meter.



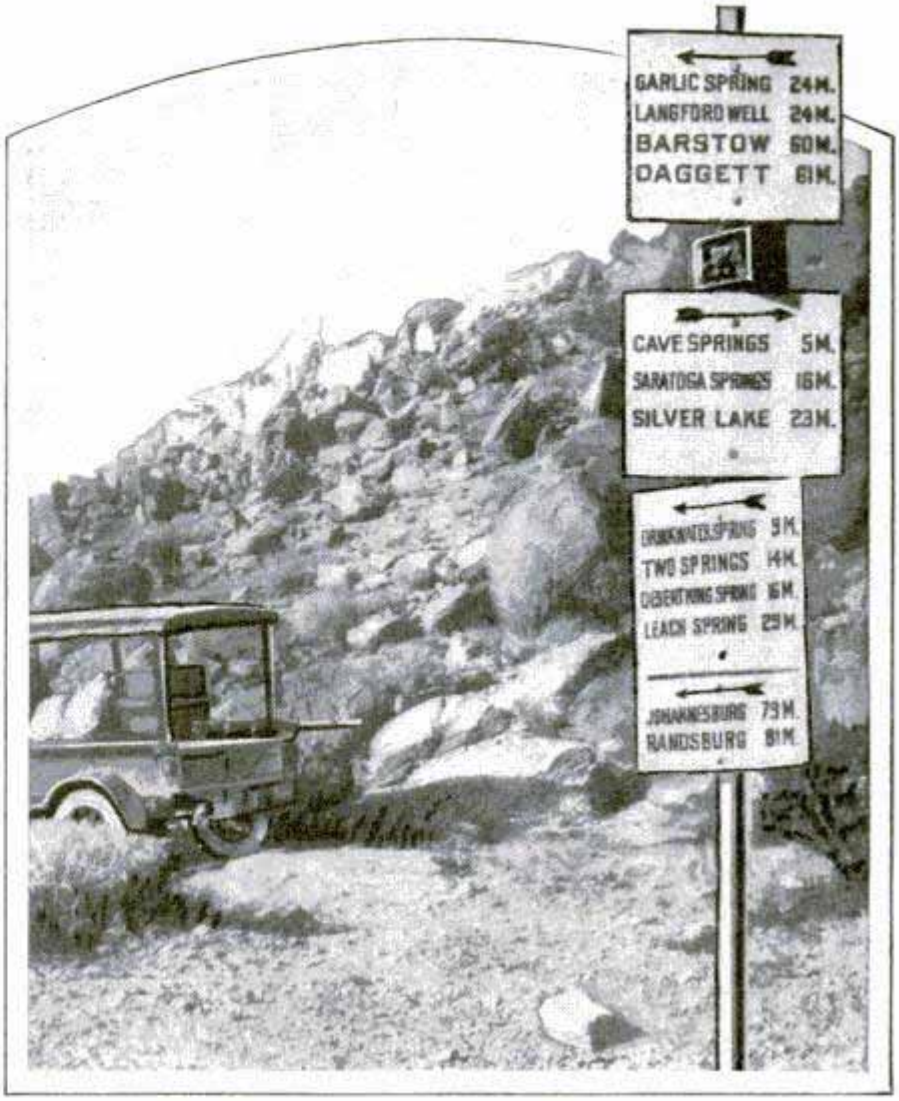
Measuring the Current Flow of a River with a Meter Lowered through Rows of Holes Cut in the Ice

Mountain climbers extraordinary are many survey engineers. Their work carries them to the very summit of our loftiest peaks. There, with the magic tools of modern hydraulic engineering—the map and the surveying rod—they create great artificial lakes, stepmothers of rivers. Few know of, but many gain by, the fact that, in regions of arid, unused land, engineers often can increase the mean flow of a river some three, four, fivefold and more, by means of expert planning and creation of storage lakes at the headwaters.

Notable among the recent large-scale developments in which far-seeing survey engineers were directly or indirectly concerned, was the Salt river project in Arizona. Here they outdid Mother Nature herself by their help in arranging an artificial lake, or reservoir, between seven and eight miles long. For many miles the available water supply was increased something like three times.

Such great storage basins are not like the popular conception of the average reservoir—which is merely a nice bit of a man-made lake. Instead they are many-shaped, many-sized, following in general the natural geological contours of the countryside. At times, they stretch some twenty, thirty and even several hundred square miles and they are regulated for the most part by a single dam situated at the "neck of the bottle," or headwaters.

If the everyday work of our surface hydraulic engineers tends to be little short of amazing in its results, no less so is that of the underground scientists of the survey. Their work has to do with discovering, developing, protecting and making more accessible the underground water resources of the country. As Dr. Oscar E. Meinzer, for the past fifteen years geologist in charge of the underground-water activities for the survey, phrases the situation: "About 55,000,000 people in the United States, or about half our total population, obtain their water from wells." Small wonder Uncle Sam is interested in underground water!



Geological Survey Signboards in the Southwestern Deserts Point the Route to Every Dependable Spring

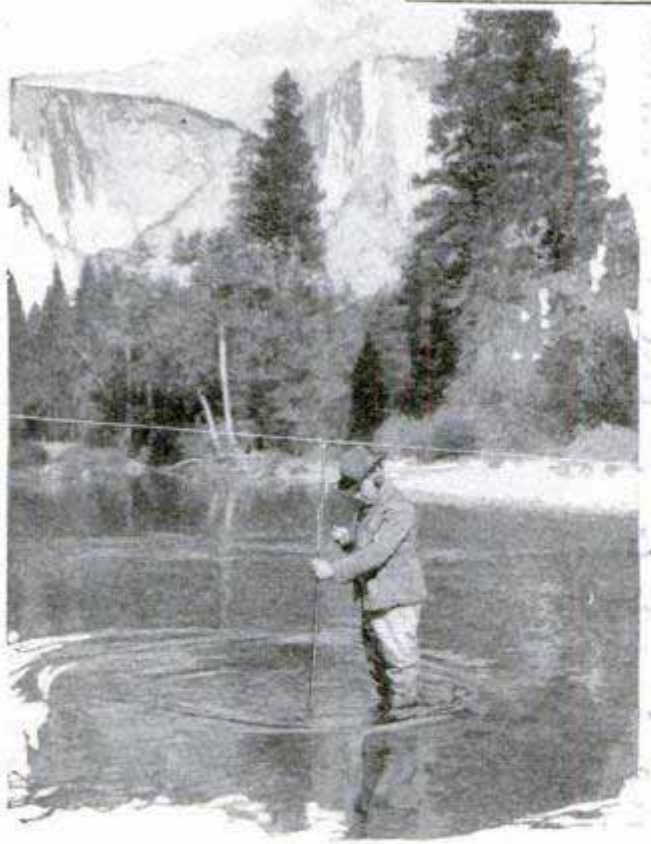
Two main classes of wells are particularly emphasized by the survey investigations: the ordinary well, or that which is pumped, and the artesian well, which the dictionary describes as "a spouting well bored down to the point, usually at a great depth, where the pressure is so great as to force the water up into the air." These wells mean that miles away, at a considerably higher elevation, vast quantities of water from rain and snow have been seeping into the porous sandstone rocks which underlie the region, and then have percolated through the rocks far down into the earth. Thus, when man's drill penetrates the deep-seated rock and water formations, the pressure underground forces the water into the air.

Locating these valuable artesian water supplies is one of the most important jobs of the government geologist, particularly in the great stretches of country in the west and southwest where arid conditions prevail. In the case of a 3,000-foot deep well at Edgemont, S. Dak., a survey geologist guessed within one per cent of the actual depth. His trained eye glanced searchingly at the available geological maps, which, by the way, he himself had constructed after many months of painstaking research.

Indeed, the underground-water geologist, by virtue of expert knowledge of strata, can approximate the extent and location of our unseen water resources with almost the same degree of accuracy as can the hydraulic engineer with respect to surface water. Nor does he always have to be on the actual scene of opera-

tions, as the following example illustrates: During the World War, an army officer, newly installed at a post in California, wired the survey for advice regarding the drilling of a proposed deep well at his base. Already he was working out plans for the purpose. However, he seemed anxious for the expert opinion of the geologists. Terse and to the point was their immediate response to the wire. Upon examination of reports and maps of the region, they found that the officer was about to try the feat of drilling through solid granite!

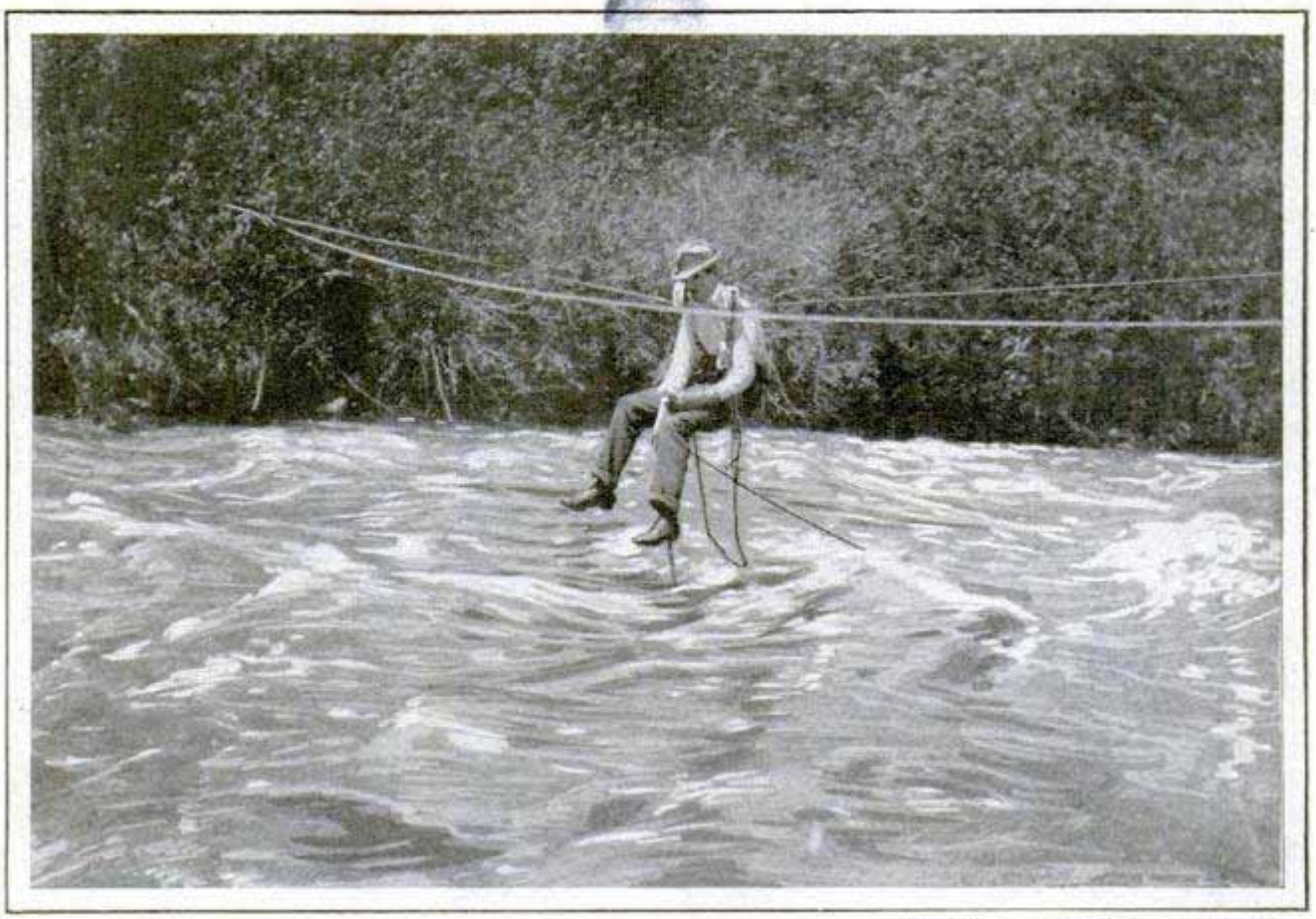
A sizable southwestern city, owing to a prolonged drought, was suffering from a serious shortage in its water supply. All the water that presumably could be obtained from mines, shallow wells and tunnels of the city waterworks proved woefully inadequate, and some of the houses on the higher levels were unable to get any water whatsoever for prolonged periods. A remedy must be found immediately, so the city was planning to purchase a spring some ten miles away, which at the time was flowing at about 145 gallons a minute, and to lay a pipe line across the mountains from the spring to the city. The project would cost about $120,000 and would involve serious engineering difficulties.



Measuring Deep Wells, and Charting the Current Flow, in Winter and Summer, with an Electric Meter

Fortunately, a survey geologist was called upon to help. Within a short time he found two sizable drilled wells within the city limits. One flowed about seven gallons a minute and the other wasn't even being used. So far as he could discover, neither well had ever been given a pumping test. Apparently they had been drilled in the attempt to get artesian water but it had not occurred to anyone that the yield of an artesian well might be increased materially by the simple process of pumping. Therefore, the survey geologist lost no time in advising the town authorities to install an air lift, which forces artesian water out of the ground considerably faster than its normal course permits, in each well.

Results were instantaneous and gratifying. For a period of three weeks both



Photos Courtesy U. S. Geological Survey

Suspended from a Cable in a Traveling Seat, Torrents Have No Terrors for the Hydraulic Engineer, Who Swings above the Rapids to Measure Depth and Current Flow of the Stream

wells were pumped, on an average, ten and a half hours a day. During this time the flowing well yielded about ninety gallons a minute, while the hitherto idle well gave about seventy gallons a minute. Thus two valuable water sources which nobody had thought were worth bothering about yielded as much water per minute as did the spring across the mountains, and their use at this time meant a saving of at least $120,000.

RUBBER IN TIRES PROTECTED BY CHEMICAL

Greatly increased mileage from automobile tires is anticipated from the use of a recently developed chemical preparation which is said to prevent the rubber from oxidizing in the air. The substance is added when the rubber is compounded and is not affected by vulcanization. According to reports, tires containing the chemical will not deteriorate through chemical reaction while in storage or carried as spares, but will fail only through wear or damage. In tests, samples treated with the preparation are said to have retained their elasticity indefinitely. It is intended for use in all kinds of rubber products, including bands, fruit-jar rings, washers, garden hose, hot-water bottles and all sorts of molded goods.

DESK FENDERS SAVE SILK HOSE FROM STRAY SPLINTERS

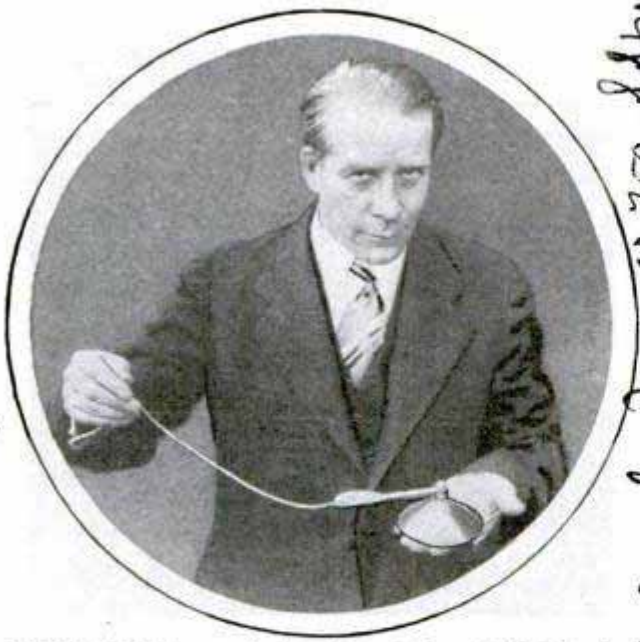
Fenders to protect the stenographer's silk hose from the splinters that lie in wait along the corners of desk legs are the newest accessory for the office. The fenders, metal strips copper-plated to blend with mahogany or oak desks, have a curved edge to fit over the sharp corner of the desk leg. A screwdriver is the only tool needed to install them.

PATENT INSURANCE PROTECTS INVENTOR AND MAKER

For the protection of inventors, manufacturers and others interested in patented articles, a new form of insurance has been announced by two eastern companies. The policies provide two forms of coverage, one for defense and indemnity in the event that infringement suits are brought against the policy holder, and the other for bringing of suits when his rights are violated. The insurance is designed to safeguard the interests of all persons concerned in a patent, including the inventor himself, the manufacturer, the seller and the user. A primary function of the plan is to alleviate the timidity that now not infrequently deters manufacturers from exploiting desirable patents.

MUSHROOM ANCHORS TO HOLD LANDING FIELDS AT SEA

Special anchors have been devised by an eastern inventor to hold the "floating island" landing fields for airplanes. They are of cup or mushroom shape and are intended to grip the bottom of the sea through the partial vacuum which will be formed within the bell-like portion of the anchor. A number of these, it is believed, fixed to a rock bottom, would keep the landing field or seadrome from being torn away from its moorings.



Model of Mushroom Anchor Intended to Hold Floating Island Airplane Ports to the Bottom of the Sea

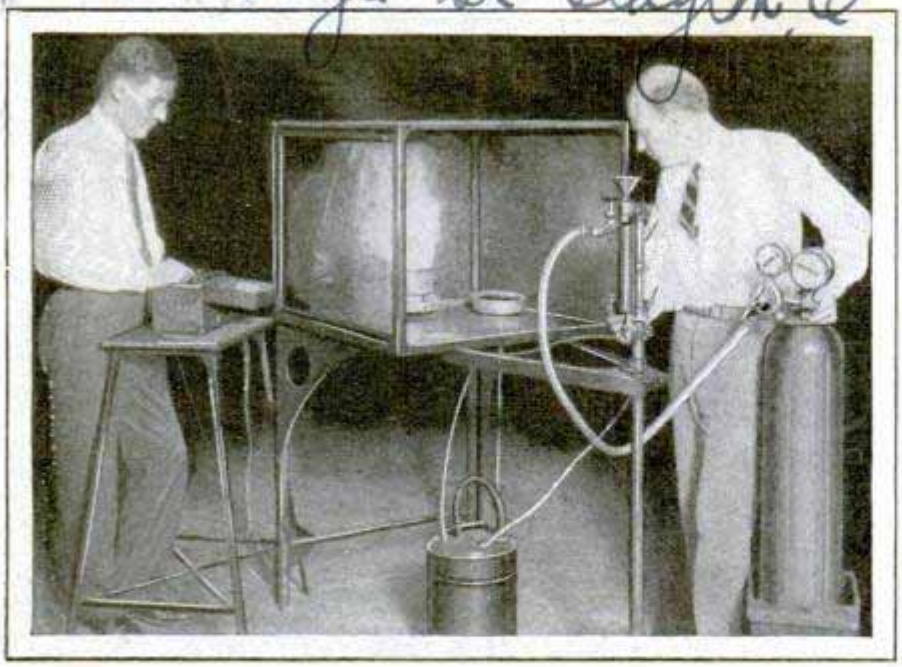
Pillar of Sleeping Porch, with Decorations Showing Changing Styles in Bonnets

HISTORY OF BONNETS IN CLAY NOVEL PORCH DECORATION

Changing styles in women's hats furnished the theme for unique decorations on the sleeping porch of an eastern man's home. On the tops of the railing posts, he modeled the heads of women wearing bonnets in fashion during the 60's, a mode of about 1900 and the turban of today.

CATNIP AS LURE FOR BOBCATS HELPS PROTECT GAME

Catnip oil is being used effectively in trapping bobcats, mountain lions and lynxes that destroy between $20,000,000 and $30,000,000 worth of game and live stock in the western states each year. It is placed on traps or on poisoned bait and seems to attract the beasts as strongly as it does the domestic cat. The government planted a catnip garden at Arlington, Va., to provide oil for the first experiments and the first trials proved so successful that larger crops were grown at Saratoga Springs, N. Y. Last year, hunters of the biological survey caught 246 lions, 3,677 bobcats and forty-one lynxes, hundreds being victims of their love of catnip.



Testing the Extinguishing Power of Different Chemical Mixtures on Blaze of Oil, in Special Cabinet Where Temperatures Were Measured

FIRE-FIGHTING TESTS HELP REDUCE LOSSES

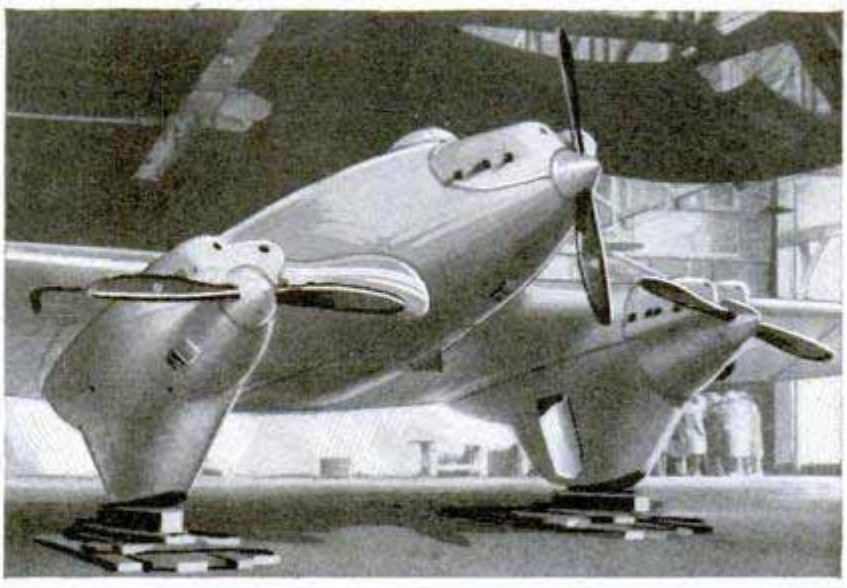
For hundreds of years, man has relied chiefly on two principal methods of combating fires—lowering the temperature by water, or smothering the blaze with substances that cut off the oxygen. These ways are now being supplemented by the use of special chemicals, notably in fighting oil and similar fires difficult to manage by ordinary means. Interesting effects have been observed in tests with these substances. Some that contain large amounts of oxygen were discovered to be effective agents in putting out fires, if the proper amount of water was mixed with them. In making the trials with the different chemicals, a special testing chamber is employed, in which carefully measured amounts are directed on a blaze of gasoline under pressure. Different solutions of the substance are tried until the most effective one is found. Accurate temperature-measuring apparatus was used in connection with the cabinet to duplicate actual fire conditions.

TORTOISE FARMS IN DESERTS TO SUPPLY FOOD

Fifty specimens of the giant land tortoise have been brought to this country from the Galapagos islands to determine if they can be raised on the desert lands of the west. The species is primarily a cactus eater, according to Dr. Charles H. Townsend, of the New York aquarium, but it also feeds on grass and vegetables of different kinds. Its value as a meat producer long has been overlooked, he declares. The tortoises sent here are infants, the largest being about the size of a washtub. In captivity, this variety often doubles its weight annually for a time and has been known to reach a weight of 400 pounds in fifteen years.

NINETY-FOOT TRI-MOTOR PLANE FOR TRANSATLANTIC FLIGHT

Undiscouraged by many failures at flying across the ocean, aviation engineers are building new ships with which they hope to make transatlantic flights practical. One of the most recent of these

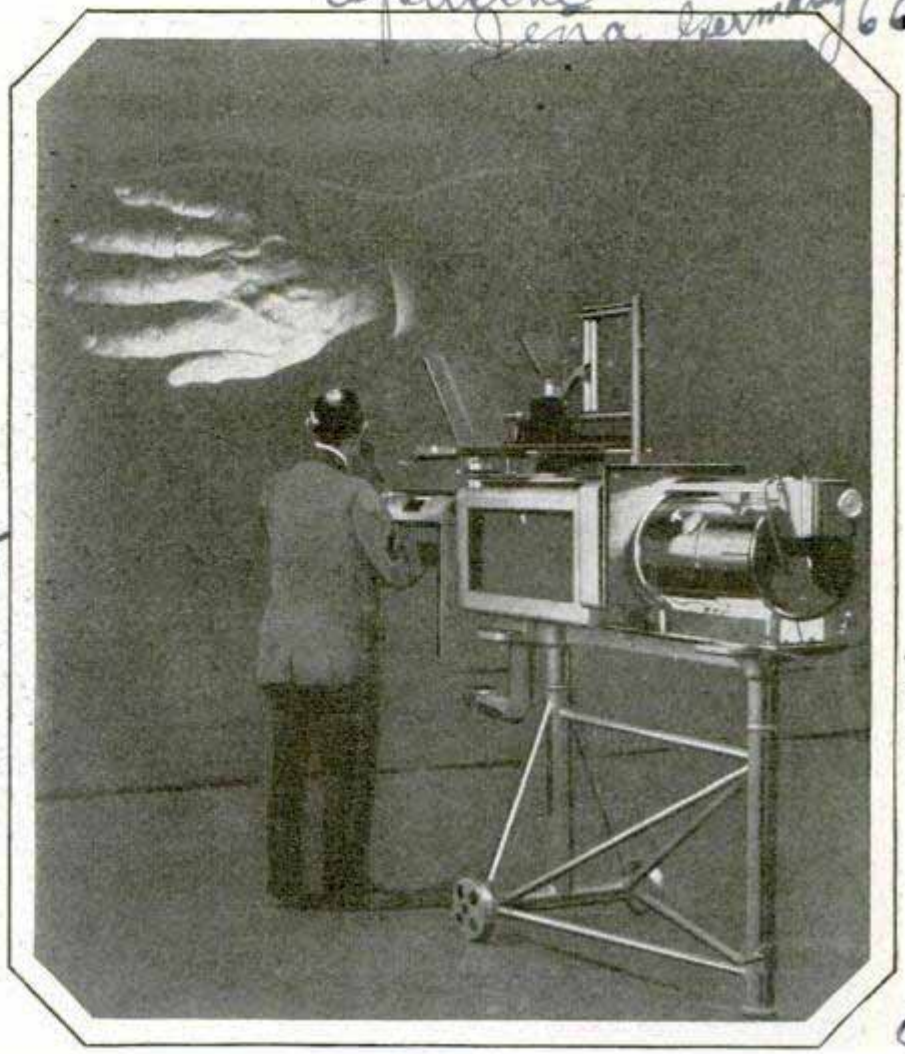


Front View of the French Tri-Motor Plane for Transatlantic Flights; It Will Carry Nearly 1,700 Gallons of Gasoline

craft is of French design. It has a wing spread of ninety feet, is equipped with three motors, each of 180 horsepower, and carries 1,638 gallons of gasoline, besides seventy-four gallons of oil. There are seven tanks for fuel. The plane will carry radio-transmitting and receiving equipment.

SEEK LONGER LIFE FOR PAPER MONEY

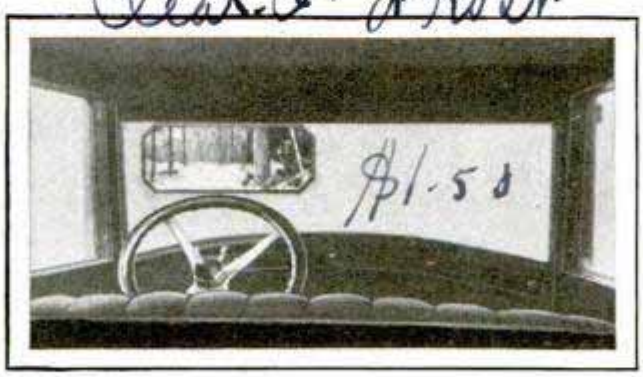
By increasing the strength of the fibers, the government has prepared paper currency that will last about twice as long as the old kind. A bank note can be folded 5,000 times in two directions without separating the fibers. Strengthening the paper with glue sizing was tried at first but with less success as the paper suffered in the process of printing. Better results were obtained by improving the fibers. Experiments are now under way to determine if cotton can be used as a substitute for linen without impairing the quality of the paper.



Three-Dimensional Projection of the Human Hand with Apparatus Intended to Aid in Lecture and Demonstration Work

AUTO WINDSHIELD KEPT CLEAR WITH GLASS PROTECTOR

Moisture and frost are prevented from collecting on the inside of the auto windshield by means of a plate of clear glass fastened to the interior and forming a dead-air space between itself and the shield. It is held securely by a half-inch rubber molding, so that no drilling or cutting is required. An additional feature is that it does not interfere with the wiper.

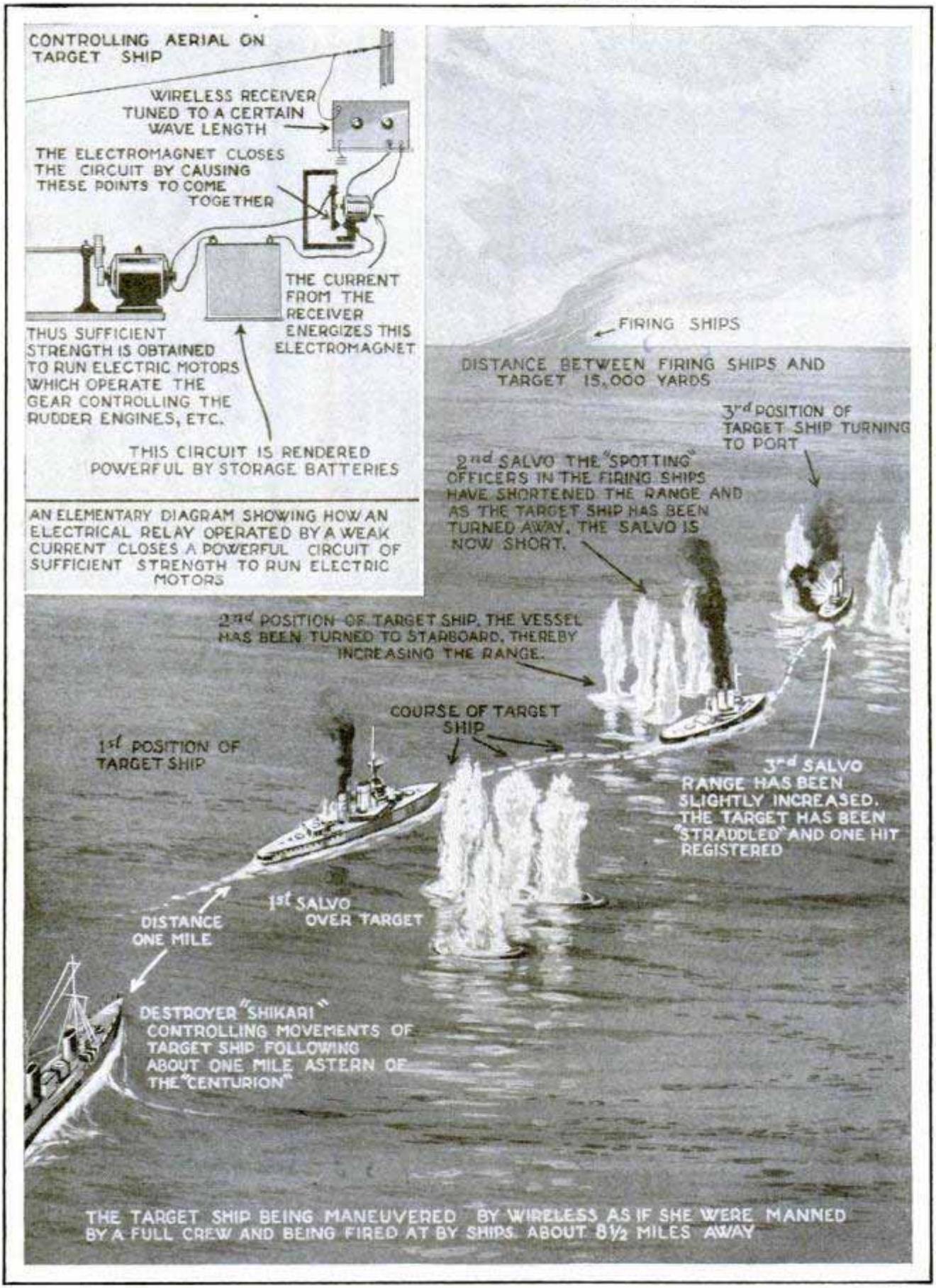


Windshield Protector Installed, Showing the Clear Space Left Due to Dead-Air Space under Glass

"SPIRIT"-PICTURE PROJECTOR TO AID TEACHERS

Objects of many kinds and shapes are projected upon a wall or screen in three dimensions, with an apparatus German scientists have developed. It produces an image from the real object through an arrangement of mirrors and lenses with special illumination. To an observer, the effect is somewhat like that of the so-called "spirit" pictures, in which a tangible object seems to materialize out of space. The projector is especially adapted to lecture and instruction work, is as simple to operate as the ordinary projector, and saves the preparation of slides.

WIRELESS-CONTROLLED BATTLESHIP, STEAMING



Courtesy The

Following in the Line of Experiments Made by the American Navy Some Years Ago, the British Admiralty Has Equipped the Old 25,000-Ton Battleship "Centurion" for Remote Wireless Control So That the Grand Fleet Can Have Actual Battle Practice without Danger

WITHOUT A SOUL ABOARD, USED AS GUN TARGET

Illustrated London News

After the Crew Is Taken Off When the Drill Ground Is Reached, the "Centurion's" Captain, from the Bridge of a Destroyer a Mile Away, Maneuvers the Battleship by Radio to Dodge Shells from the Enemy beyond the Horizon, and Thwart the Torpedoes of Attacking Destroyers

Weaver, and Sample of Seamless Trousers Made from Burlap

WEAVES SEAMLESS TROUSERS IN HAND LOOM

Trousers are woven without seams from such materials as burlap and other cloth by an eastern expert who has had more than sixty years' experience with a hand loom. Even the side openings for the pockets are woven instead of being cut. The garments have a neat appearance.

CLOCK BUZZES WARNING OF ENGAGEMENTS

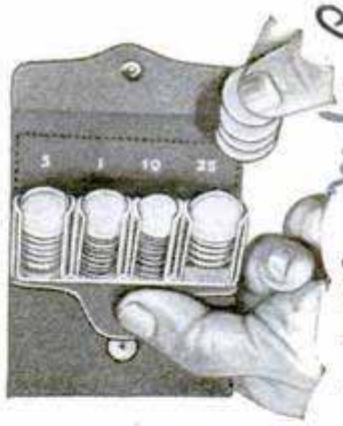
To aid in keeping appointments, a memory-jogging clock that gives an audible and visible reminder of duties to perform, has been introduced. Around its face are forty-eight slots, one for each quarter of an hour. A tab, bearing a memo of the engagement, is inserted in one of the slots opposite the proper time and the alarm set. When the hour arrives, the clock gives a buzz, which sounds for five minutes but ceases when the tab is removed.

TONS OF EXPLOSIVES SHIPPED WITHOUT LOSS OF LIFE

Last year, nearly 500,000,000 pounds of dangerous explosives were shipped in the United States and Canada without loss of life or injury to any person, and with a money loss of only $45. The record is considered largely due to the efforts of the bureau for the safe transportation of explosives and other dangerous articles, organized in 1906. Nearly 230 different kinds of merchandise are now listed by this bureau as requiring special handling to prevent fire and explosions. In 1907, explosives were charged with seventy-nine accidents, fifty-two fatalities, eighty personal injuries and a property loss of nearly $500,000.

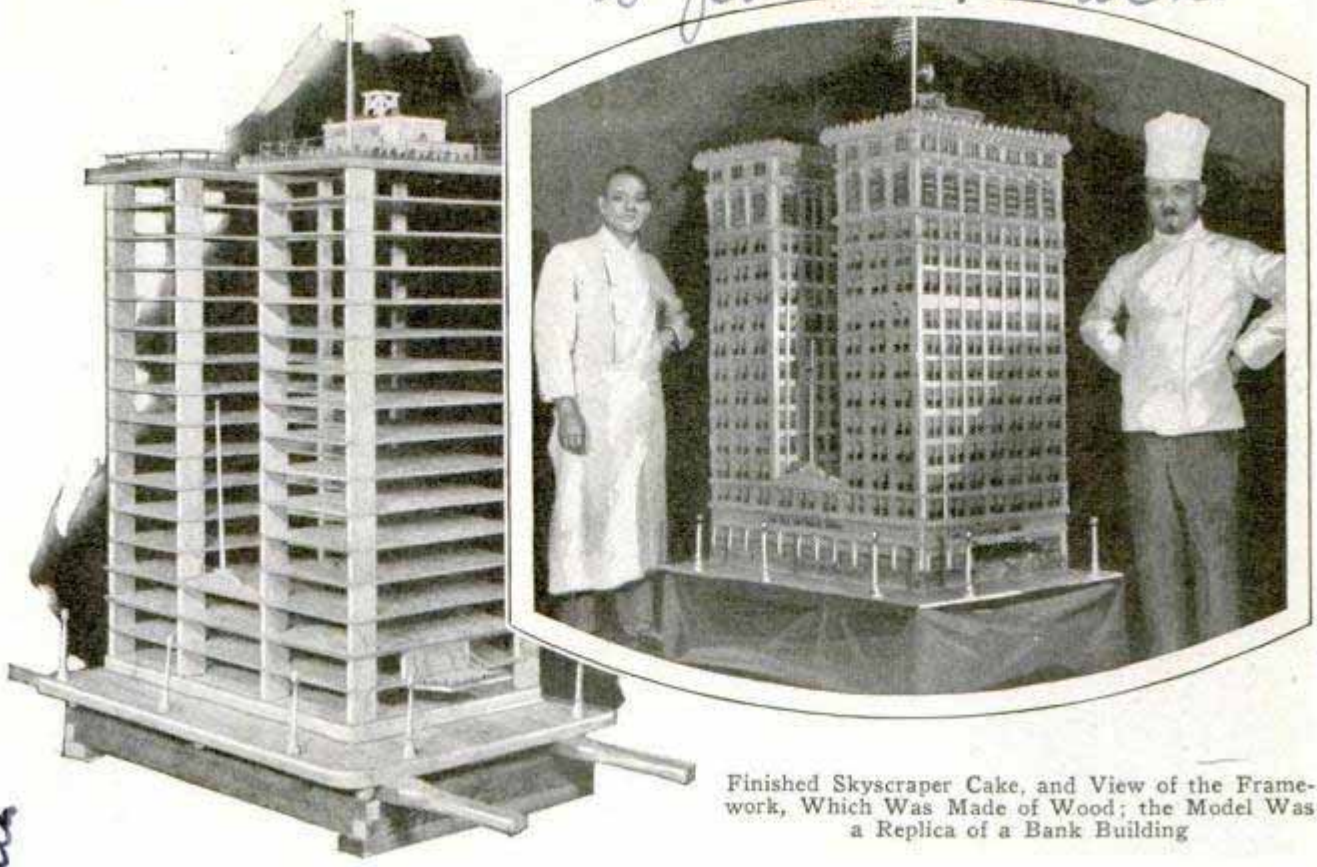
HOLDER KEEPS COINS SORTED SAVING TIME AND LOSS

Coins of different denominations are kept conveniently sorted, where they are not likely to become lost, and may easily be picked out, in a pocket holder recently introduced. This saves searching for the right coin, reduces wear on the pocket and enables a quick estimate of the amount of money on hand. Beside the compartments for small coins, the holder has space for those larger than a quarter and for bills.



KEY CASE WITH SWIVEL HOOK SOLVES TURNING PROBLEM

A leather key container with the hooks mounted on swivels, so that the key in use can be turned without revolving the entire case or twisting a part of it, has been placed on the market. Each hook is mounted on an individual swivel disk that turns easily by itself. A leather flap carries an identification card under a transparent window to insure return of lost keys, or identification of the owner.



Finished Skyscraper Cake, and View of the Framework, Which Was Made of Wood; the Model Was a Replica of a Bank Building

CAKE IN FORM OF SKYSCRAPER WEIGHS HALF A TON

They built a skyscraper in three weeks in Spokane, Wash., recently, but the structure was of wood and pastry and the result was an enormous cake, a replica of a bank building in the city. The cake weighed 1,100 pounds and was formed about a framework of wood. Its builders took out an insurance policy on it.

RECORDS MADE IN YOUR HOME WITH PHONOGRAPH UNIT

A recording attachment for any make of phonograph is now available for those who wish to make their own records at home, preserve the voices of their loved ones or "can" radio programs for future use. The unit operates on familiar principles but requires no skill to use. It is simply attached to the phonograph, you speak into the horn, and the voice is recorded and ready for reproduction in a few moments. Blank disks are furnished with the outfit, which has been recommended especially for voice and dramatic schools to enable the pupils to listen to their own performances and so correct their errors.

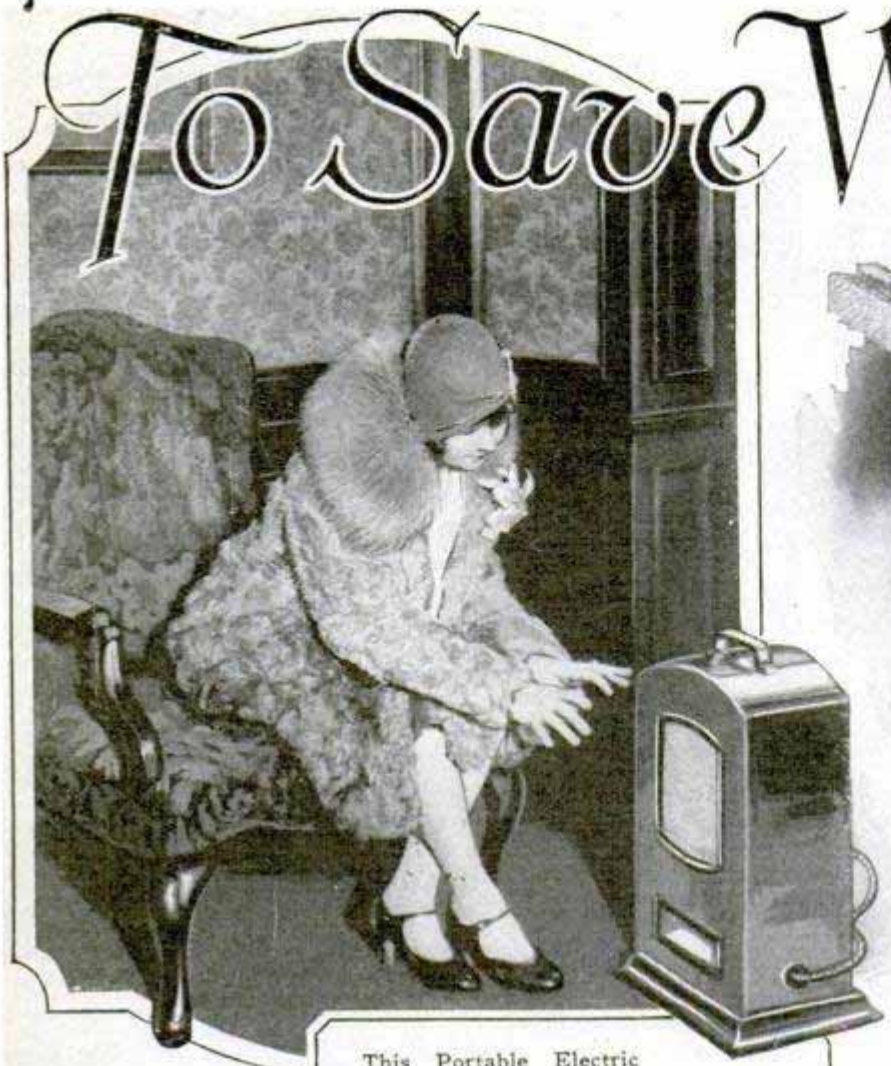
Making Her Own Phonograph Record; the Attachment Is Easily Adjusted and Is Simple to Operate

TYPEWRITER FOR THE BLIND HAS SIX KEYS

Portable typewriters, cross-word puzzle boards, and a set with which children can work problems in mathematics, are among the recent aids developed for the blind. The typewriter has only six keys, yet it prints every letter in the alphabet and all the common signs in the perforated Braille system. At the headquarters for the war and civilian blind in Paris, a rotary press that prints 12,000 Braille pages an hour has been received from Switzerland. Former machines turned out but 4,000 pages.

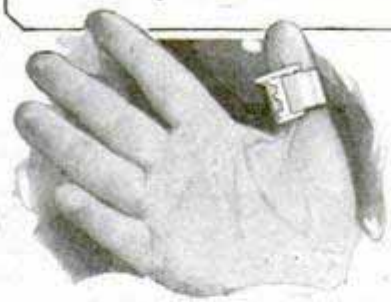
422

To Save Work



This Portable Electric Heater Contains a Fan and Generates Steam to Insure Circulation and Healthful Condition of Warm Air; It Uses About as Much Current as a Flatiron and Requires Little Attention

Window Cleaner, with Brush and Squeegee, Also Has a Container to Hold Water So That a Pail Is Unnecessary; It Combines Four Tools in One, Saving Time and Trouble



To Keep the Infant from Sucking Its Thumb; This Small Attachment Is Held by Adhesive Tape

The Handle of This Magnifying Mirror Contains a Nail File and a Pair of Tweezers, and Folds Up as a Support for the Glass on Table

For the Traveler Who Wants Pure Water, This Electric Unit, Operated from Lighting Socket, Floats and Collects Impurities as a Scum Which Is Easily Removed

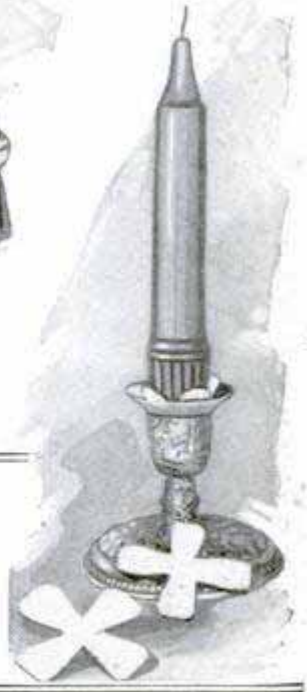
in Your Home

Food Press Is Easily Taken Apart for Thorough Cleaning and Has an Efficient Dasher

With Combination Stopper and Strainer, the Sink Is Converted into a Dishpan, Saving the Bother of an Extra Article

Pastry Cutter and Mixer, Invented by a Woman, Saves Time and Is Said to Insure Lighter Crusts; It Supplants Hand Method of Cutting Shortening into the Dough

The Back of This Clothes Brush Has Small Tank for Cleaning Fluid, to Aid in Removing Spots



Cross-Shaped Candle Support Holds the Candle Securely in Socket and Also Catches the Drippings; It Is Serviceable When Sticks Are Too Large for the Candle

Civilians Studying Army Maneuvers on Model Map; Problems Are Worked Out by Directing Hypothetical Troops over Mimic Battlefield

WAR GAME WITH MODEL MAP TRAINS CITIZEN SOLDIERS

Civilians being instructed in some of the fine points of war, make use of a model map, like those employed at the war college in Washington. The group is divided into opposing sides and the various moves to be made by a hypothetical army are indicated on paper. Hills, trees, railroads and other strategic features are represented on the map.

RAIN AND SNOW FEED GEYSERS IN YELLOWSTONE PARK

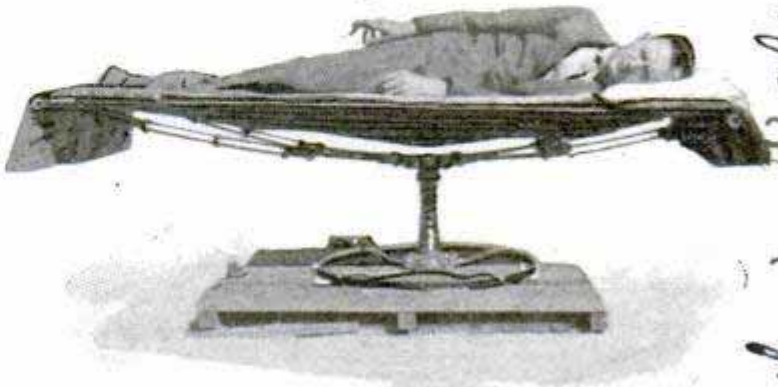
Rain and melting snow help run the geysers in Yellowstone park, scientists have found. The columns of steaming water are shot up, not wholly by the action of subterranean boiling springs and vast steam chambers, but by rain water and melting snow trickling through fissures in the surface of the rock until they meet steam and other volcanic gases from a buried lava mass. The water gets hot and when a certain pressure is reached, the geyser spouts. There are three main classes of hot springs and geysers: those sending out the greatest volumes of water, clear, very hot and usually alkaline in reaction with but little sulphur; smaller ones whose water is often acid and turbid, and a third group whose water contains lime and considerable sulphur but is comparatively clear and not excessively hot.

GAS FLAME KEEPS FISH SHIPMENTS FROZEN

Shipping fish in iceless refrigerator cars has been successfully tried between New York and Fort Worth, Tex. The cars are equipped with freezing apparatus that utilizes a gas flame and a special material which produces intense cold in combination with the flame. No source of mechanical power is required, and the compactness of the refrigerating unit increases the space available for loading by about ten per cent.

FOLDING PEDESTAL BED FITS IN DRESSER DRAWER

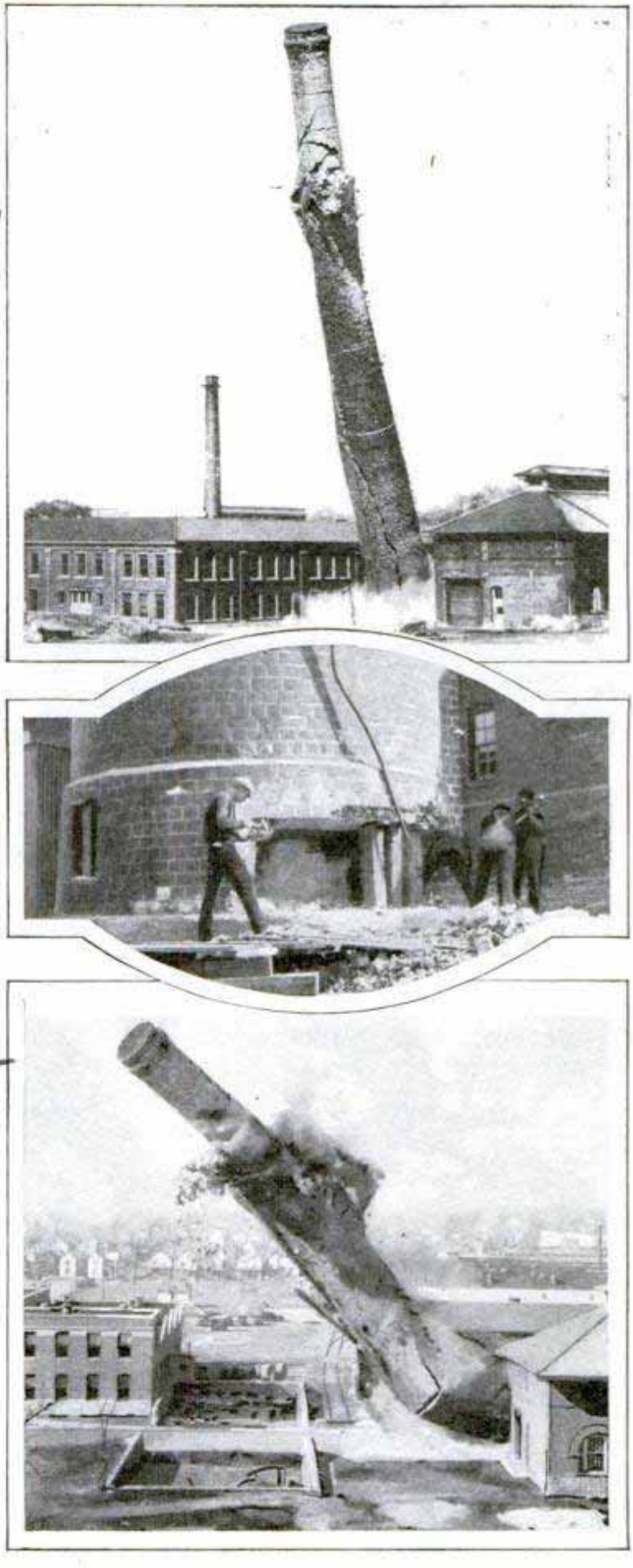
Instead of standing on four legs, a folding bed, introduced by a California inventor, rests on a center pedestal. It is said to conform more nearly to the figure of the occupant and needs but little bedding for comfort. In a few moments, it can be converted into a wall bed or may be taken apart and placed in a bureau drawer. A special feature is that the support revolves on the pedestal, making the bed suitable for use in a sickroom.



Bed on Pedestal Instead of Legs Can Be Folded in Small Space and Gives Comfortable Support

FELLING GIANT CHIMNEY SHOWS SKILL

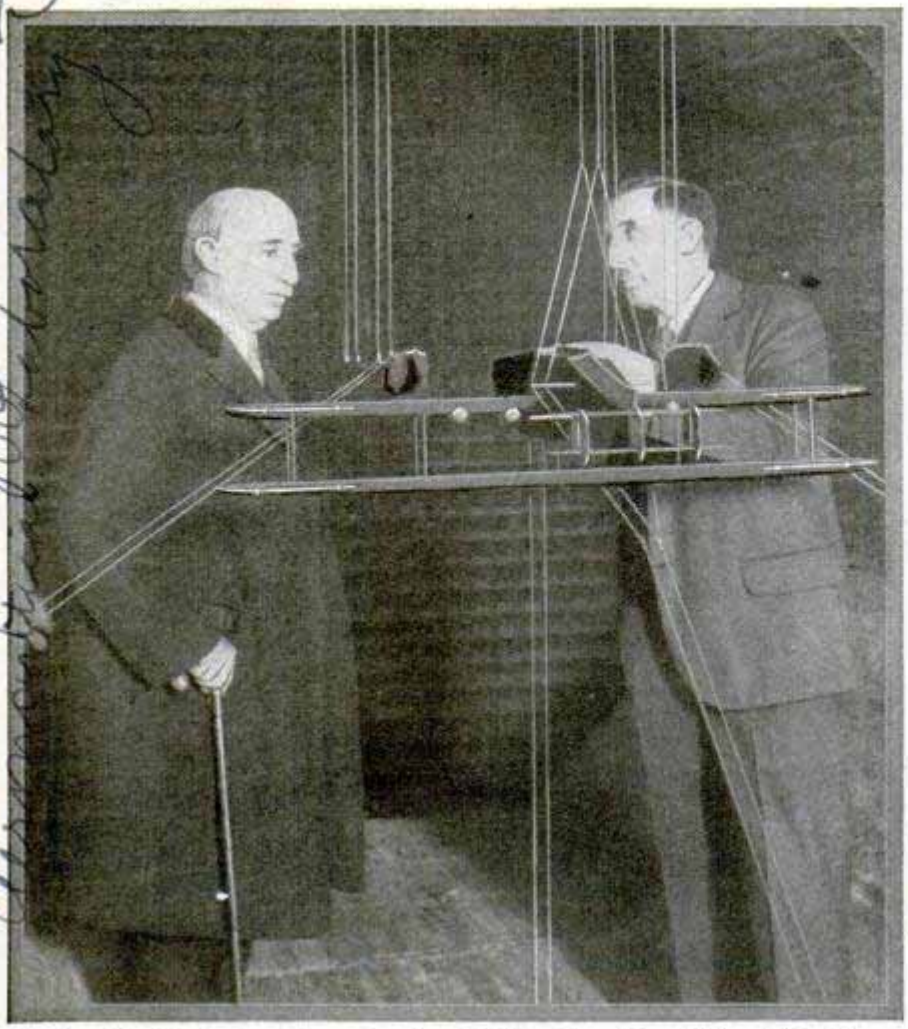
Toppling a 700-ton smokestack, 204 feet high and seventeen feet in diameter, is as easy as felling a chestnut tree, if you know the trick, according to W. M. Barber, veteran chimney thrower. He demonstrated his skill recently when he wrecked a huge stack on the Ohio State University campus, bringing the big pile down within a few feet of a building without damaging that structure. Workmen first cut away the bricks and concrete on the west base of the chimney, since it was to fall westward, and filled the hole with timber props. After the supports were in place, they were covered with inflammable material that had been soaked in oil. A match flared, the pile was ignited and for nearly half an hour a big crowd waited while the chimney smoked. Finally, the fire-eaten supports began to crumble. A minute later, the whole structure collapsed. An added thrill was furnished when a large crack broke through the base of the stack and tore zigzag toward the top, as the chimney fell.



Big Chimney Splitting Just as It Fell; Cutting Away the Bricks for Temporary Timbers That Were Burned, and Stack an Instant before Final Collapse

PHONE SHIP AND PLANE BY DIAL SYSTEM

Telephone messages to moving ships, airplanes and trains are now possible by the dial system, provided the proper receiving apparatus is carried. By the new method, which has just been developed, a subscriber sitting in his home might talk to a passenger on the "Leviathan" at sea, could get a message to the Twentieth Century Limited as it sped along or reach the "Los Angeles" while is was high in flight. The process permits linking of radio and land-wire systems and is not expected to supplant the existing land-telephone installations but merely to amplify them.



Testing Model of the Giant Seaplane Which Has Been Planned to Carry 300 Persons at One Time across the Atlantic

SEAPLANE TO CARRY HUNDREDS OVER OCEAN IN FEW HOURS

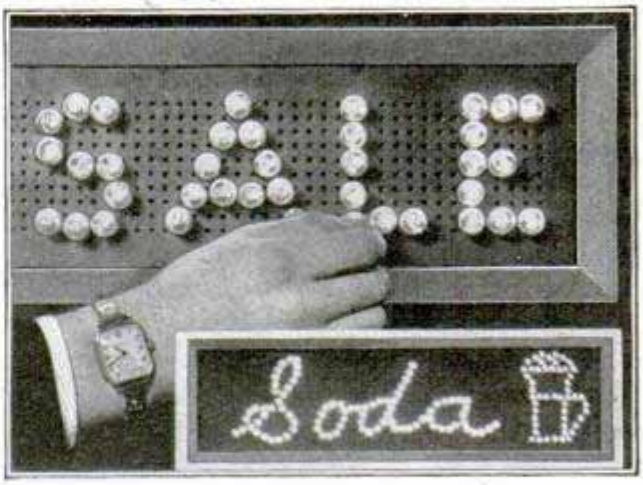
Transatlantic flights in nineteen hours in a giant seaplane that will carry 300 persons at one time, are planned with a craft being designed by a New York inventor. Whether the plan will be a success or not, is being determined to a degree of certainty, by means of wind-tunnel tests on a model of the plane. These experiments reveal any structural defects or faults of design, so that errors may be rectified.

OUNCE OF RICKETS REMEDY EQUALS TONS OF OIL

Irradiated ergosterol, a new remedy for rickets and similar bone diseases discovered a year ago, is so powerful that a single ounce of it is equal in effect to six tons of cod-liver oil. The substance, which is the parent material of vitamine D, is so potent that a twenty-five-thousandth of a milligram, a quantity almost inconceivably minute, will protect a rat from rickets when added to its daily diet. Dr. Alfred Hess, of Bellevue hospital, New York, and Prof. A. Windaus, of the University of Goettingen, Germany, working together, discovered the remedy. Babies receiving from two to four milligrams a day in the Bellevue hospital clinic are almost regularly cured, according to Dr. Hess. One of the advantages of ergosterol over cod-liver oil is that it is both tasteless and odorless, so that it is easy to get children to take it.

CHANGEABLE SIGNS MADE UP WITH LOOSE LAMPS

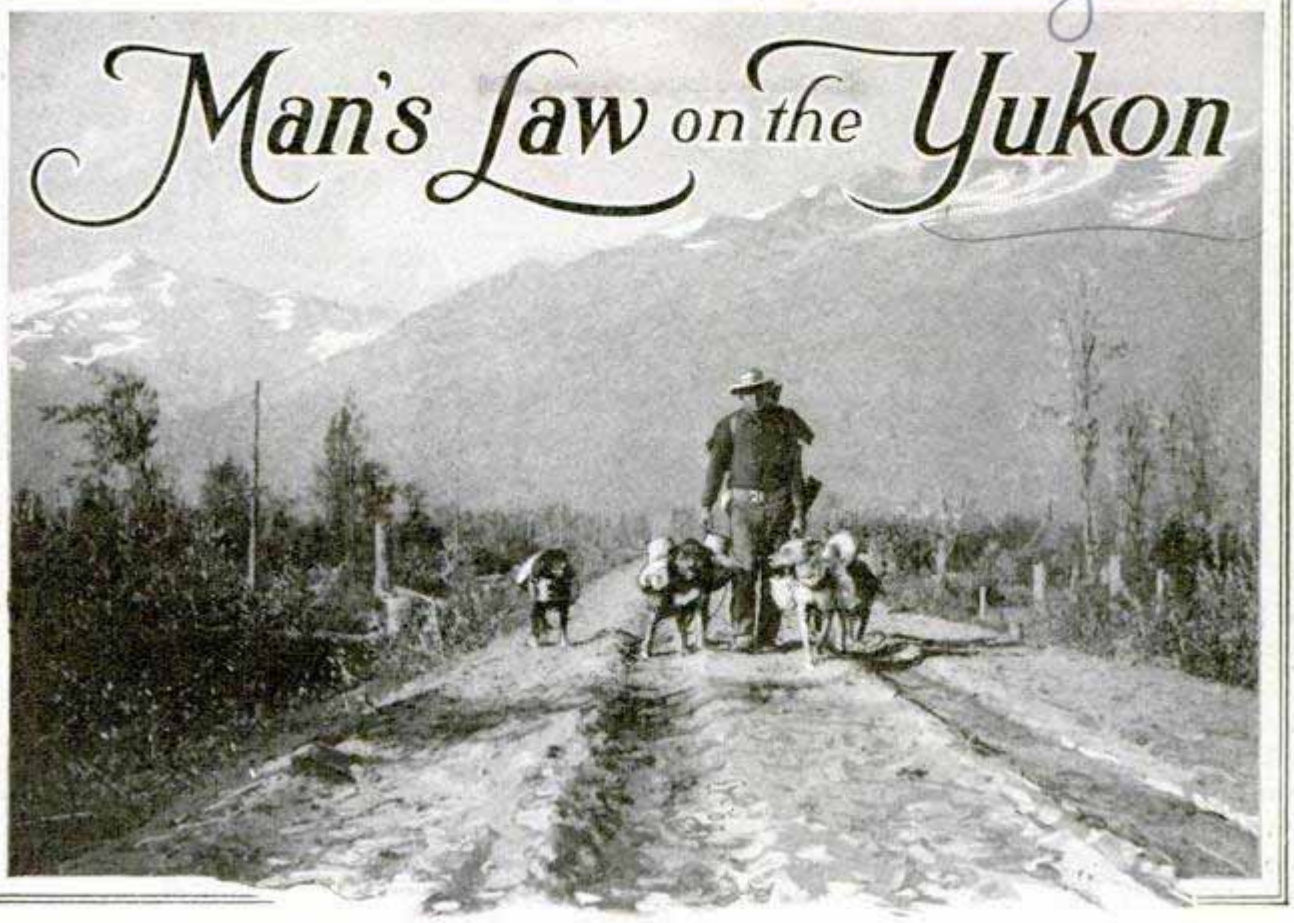
Electric signs in the form of panels with perforations, in which letters, numbers and designs can be arranged with little trouble and changed at will, have appeared in advertising. No alphabets, guides or other accessories are needed, the legends being made with small lamps which anyone can insert. A druggist, for instance, could utilize space and



Inserting the Small Bulbs in Board, and a Sample of Illuminated Design

current required for a fixed sign, to advertise a different feature daily.

Man's Law on the Yukon



Courtesy U. S. Geological Survey

In Summertime, the Sled Dogs Become Pack Carriers and Frolic Along as the Alaskan Game Wardens Cross Snow-Clad Mountain Ranges on Their Rounds

NINE men, with a territory nearly a fifth as large as the United States, spread over an area almost as wide, a large part of it virgin wilderness, have brought the law to the Yukon district.

The nine game wardens of the United States biological survey have been, since 1925, charged with the great task of enforcing game laws in Alaska, once a fur paradise where men have been accustomed since the beginning to trapping and hunting what they wanted when they wanted it, without regard to open or closed seasons.

Mighty rivers, tundra plains, ranges of mountains that include the highest peak in North America, a vast chain of islands stretching in a giant semicircle far out toward the shores of Asia, glaciers, volcanoes, alive and dead, the famous valley of Ten Thousand Smokes, the home of the brown Kodiak bears, largest living carnivorous animals; all these and many more come within the empire ruled by just nine men. Some day, when the force is recruited to full strength, it will number fourteen—the maximum the game law allows to police 586,400 square miles of land and water—a territory more than twice the size of Texas, and with a population, at the last census, of but 55,036.

To police it, the nine have divided the mainland and the long chain of the Aleutian islands into districts. The smallest is 360 miles across, and the biggest 1,600 miles long. The latter includes the islands of the sea, the active volcanoes, the valley made famous by its thousands of smoking, steaming craters, the seal rookeries of the Pribilofs, and the only way to cover it is by boat through some of the world's worst seas.

Sudden storms and treacherous fogs, and the always present menace of freak winds, the "willie-waws" of the north, make the Aleuts a constant danger zone. Small, stanch ocean-going boats, moderate in length, but built with the flaring bows, deep draft and straight sides of the north Pacific halibut fishing fleet, are used by the seagoing wardens.

On the mainland, the mighty Yukon and its maze of tributary streams, provide ice-sheathed roads for dog sledges in winter,

Pair of Frolicsome Brown Bears, Largest of Their Tribe in the World, and a Dog Team Mushing Supplies over the Ice

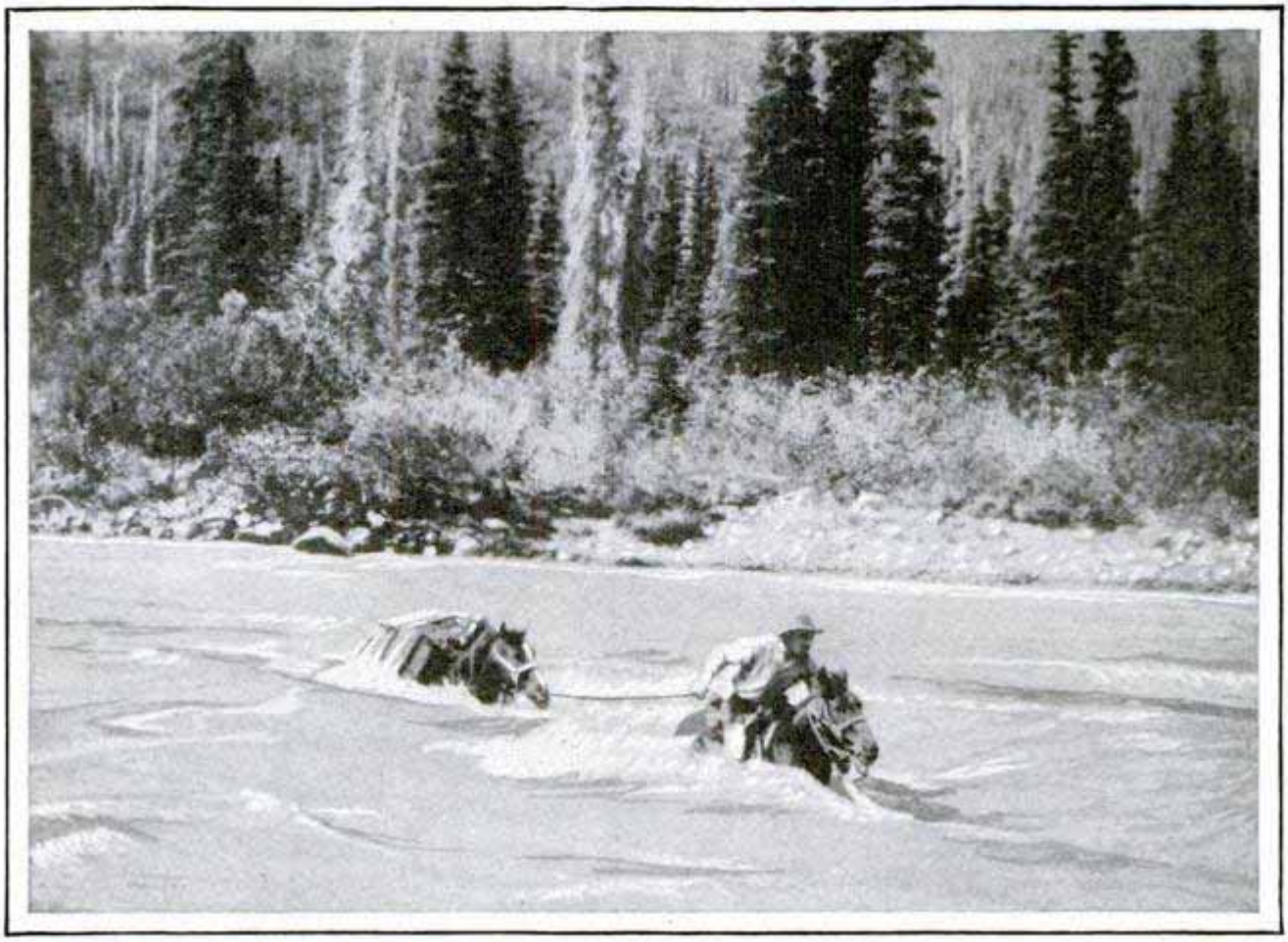
and lanes for small steamers or canoes in summer. Away from the rivers there are few trails, no roads, once the settlements are left, and only dogs as the main reliance for transportation. In winter, the sled dogs drag in supplies, and in summer they carry small packs strapped to their backs. A few horse pack trains are used, but much of the territory the wardens cover is too rough even for pack horses to get through.

In such an empire it is easy for a man to drop from sight and never be heard of again. Not long ago, fifty men, in ten small steamers, searched the Chichamin river for weeks without finding a clue to the fate of one of the wardens. Five weeks before he had chartered a boat to make a hurried trip up the river. Under orders to exercise extreme care on his mission, which was presumed to be a secret, he had also been directed to reduce expenses as far as possible, so his renting of a boat for the hurried journey indicated something important had developed. Yet man and boat both disappeared, and no trace of either has ever been found.

Until a few years ago fur trapping and hunting in Alaska, yielding a return running into the millions, went practically unregulated. What closed season there was, was dictated entirely by the trappers' instinct against taking a pelt not yet in its prime. Under such conditions the available fur supply has dwindled rapidly in recent years.

When the biological survey took charge, in 1925, it started with a closed season on such fast-disappearing species as the marten and beaver, and a reduced bag limit on others, including trophy hunting for moose. Game regulation has never been popular with professional hunters, and in a region where there never had been law enforcement, the task of the wardens was enormous. But, according to Ernest P. Walker, formerly executive officer of the Alaskan game commission, who helped put the new regime in operation, the wardens have established the record of winning ninety-six per cent convictions where they went to court with offenders, and the heavy penalties instilled respect for the new order of things.

Chosen from the pick of Alaska's trail experts, the game guards are noted not only for being quick on the trigger, but likewise for being level-headed and cool. Two years after they went into action, the game regulations were strengthened by a rule requiring every legally taken beaver



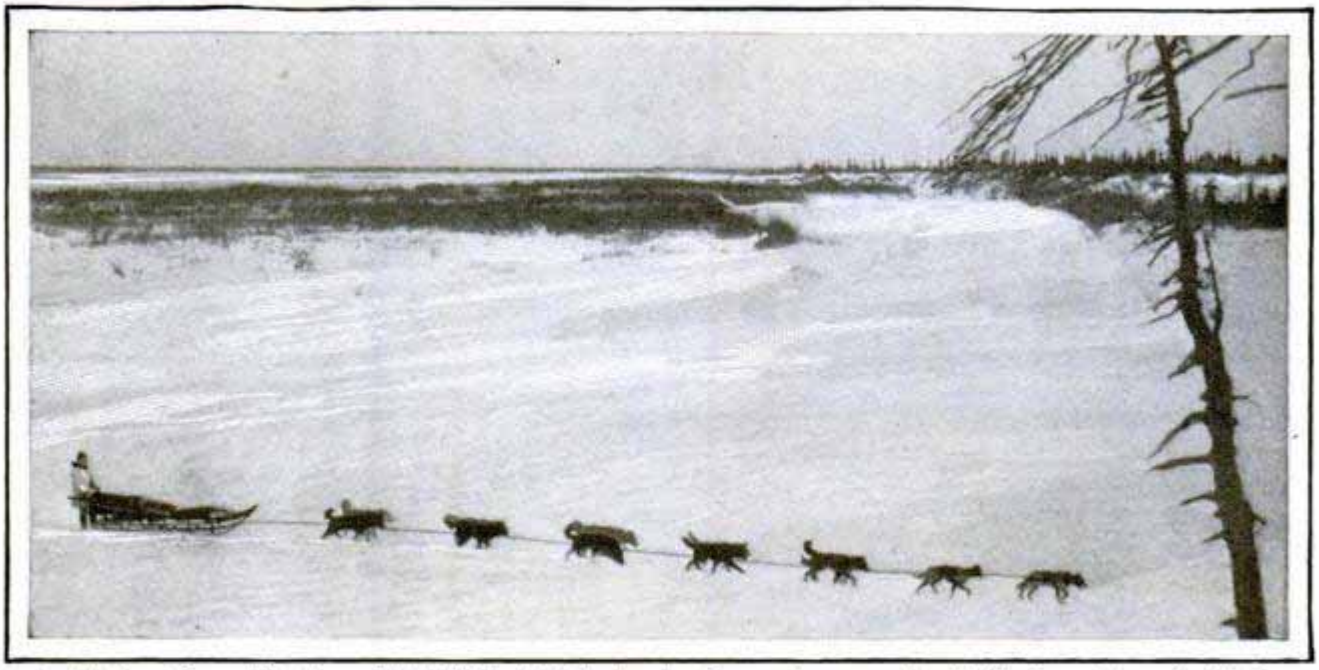
Bridges and Fords Are Rare in Alaska, So, Frequently, the Game Wardens and Their Pack Horses Must Plunge through Brawling Rapids, at Imminent Risk of Death

and marten pelt to be presented for the inspection of the game commission or wardens, and also demanding an affidavit from every trapper attesting the legality of his catch.

The temptation to beat the law is strong, for a single marten pelt may bring $100, and a few laid away before the season opens, later to be smuggled out and sold to some fur buyer, may net a tidy sum. A beaver pelt brings, on an average, $20, and the trapper is limited to ten in southern Alaska and twenty each season in the north. Every five that can be taken outside the law means another $100 profit.

In making their rounds, the wardens utilize almost every form of primitive transportation, and now they are beginning to adopt the most modern of them all, for flying is being established on a practical basis in the far north. Thirty-odd landing fields have been cleared, and several air lines are in active operation. On many trips the cost of an airplane is cheaper than travel by dog sled, for weeks of painful work may be compressed into a few hours by air.

With a range in climate from warm summer days, to winter blizzards, when the thermometer may drop to fifty or sixty below zero, the work of the wardens is far from pleasant. One, in his report of a long and lonely patrol from Bethel, somewhat north of the Kuskokwim river down to the Bristol bay region, tells of starting in winter, sledging his camp equipment and supplies over the snow and ice. A warm spell before he reached his destination melted the surface snow and softened the ice until, at river crossings, the dogs were almost buried in slush. Even in summertime, with the ice danger removed, crossing Alaskan streams is no child's play. Coming down from the mountains through narrow gorges, dropping rapidly toward the plains, the rivers and creeks abound in rapids, and there are no well-marked fords by which they can be crossed. Even the navigable streams are dangerous, and the small steamers that travel them during the short summer season are provided with enormous timbers which can be thrust out from the sides to keep them from being



An Alaskan Game Warden, with Well-Loaded Sled and a Dozen Dogs, on the Trail; Away from the Settlements, Dogs Are Still the Main Reliance, though Reindeers Are Coming In

whirled into the river banks in bad gorges.

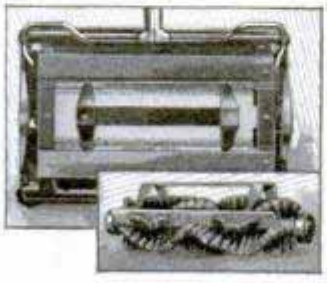
Not all the adventures of the game warden are with poachers or natural enemies. Occasionally, the game they are protecting takes a dislike to them and other animals show fight. One of the force was badly mauled in a battle with a giant Canadian lynx, and the brown bears of Kodiak are notable for their short tempers, while even a moose is not averse to charging, if cornered.

The introduction of reindeer into Alaska has lessened the game hunting by Indians and Eskimos in search of food. Instead of being nomads, continually moving from place to place to follow the migrations of the game, the natives are settling down to the job of shepherding the vast flocks of reindeer. Starting only a few years ago with 1,200 animals imported by the government from Siberia, the herds are now counted in the hundreds of thousands, and a thriving meat-packing industry is springing up.

The reindeer also are displacing the dog teams. Their greater speed, and ability to dig out their food from beneath the snow, make them especially valuable.

COMBS IN CARPET SWEEPER KEEP BRUSHES CLEAN

Brushes in a carpet sweeper now on the market automatically keep clean, saving the user much unpleasant work and loss of time. This is accomplished by combs, so adjusted that they remove dirt from the bristles as they revolve and convey it to the sweeper pan. One comb swings in as the other swings out, the action causing the combs to clean the brushes and the brushes to clean the combs. For sweepers not already equipped with these cleaning units, sets of combs are furnished and may be installed with little trouble.



CORN HUSKS TO POLISH RUBBER SERVE AS EMERY

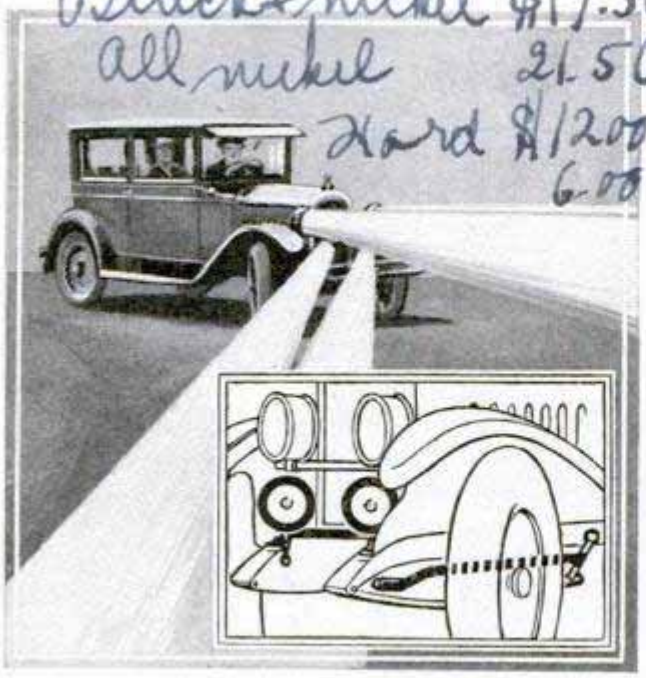
Corn husks, generally considered as a waste product, have been applied to various manufacturing processes as polishers for hard rubber. Cleaned and clamped between two iron disks, with an axle through the center, the butt ends are used to give a high luster to the material in much the same way as emery wheels are employed. Automobile steering wheels and combs of hard rubber, as well as a number of other articles of common use, are often polished in this manner.

SPEECH IN EIGHT LANGUAGES AT SAME TIME BY RADIO

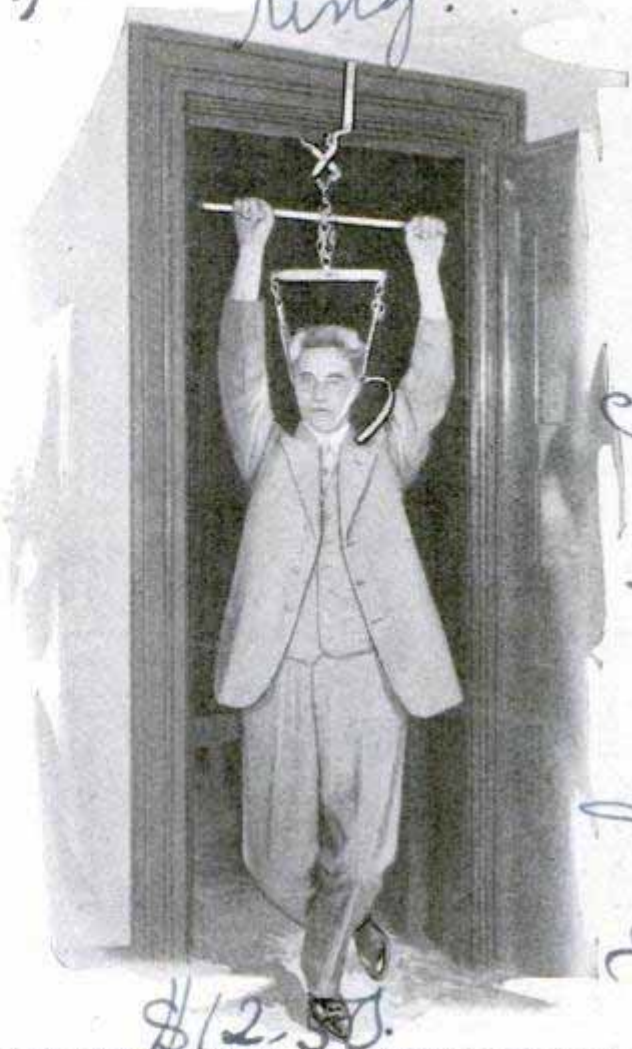
With the aid of interpreters and a special broadcasting installation, persons attending a labor conference at Geneva were able to hear the same speech in as many as eight languages at one time. As the talker delivered his address, the interpreters, sitting at microphones, translated his words into different tongues and relayed them through an amplifying circuit to the hall, where the auditors were provided with special listening equipment, so that they could tune in on any translation desired. The interpreters talked in low tones so as not to disturb the speaker or interfere with each other. Experiments are being made to record the speeches in the various languages without the help of shorthand reporters.

STEERING WHEEL TURNS LIGHTS FOR SAFER DRIVING

Driving the automobile at night is made safer and easier with a pair of lights adjusted to turn as the steering wheel is turned so that the roadside is well illuminated on either side and on turns. Being set below the regular lights, the special lamps do not shine into the eyes of approaching drivers. They may be operated with or without the main lights and have a special control button on the dash.



Photograph and Drawing to Show How the Special Automobile Lights Swing with the Front Wheels



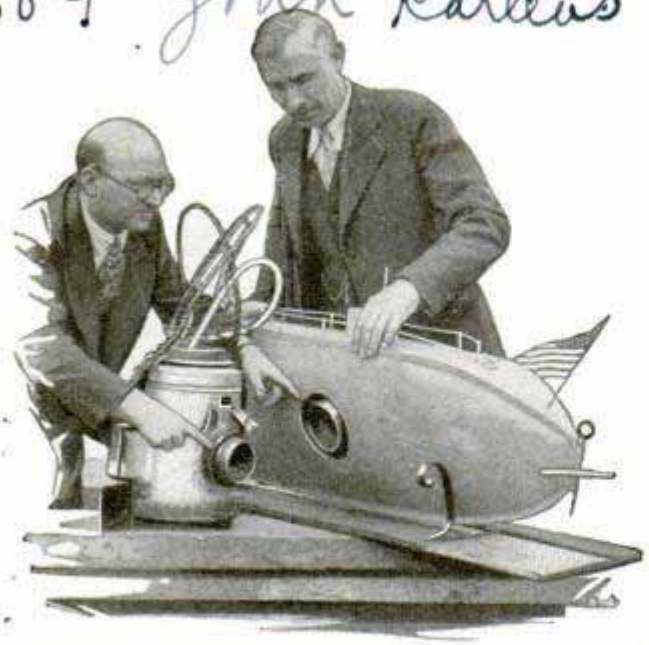
Home Exercising Outfit, with Special Attachment to Stretch and Strengthen the Neck Muscles

NECK EXERCISER FOR HOME USE HELPS PROMOTE HEALTH

Attached to the door frame, or other convenient location, an exerciser to strengthen the muscles of the neck has been introduced. It affords healthful recreation, calculated to improve the circulation and benefit the nerves.

MICROPHONES IN JAIL ROOM TO TRAP PRISONERS

Microphones and loud speakers have been used successfully in the Los Angeles county jail in obtaining evidence against prisoners. Installed in the "shadow box," the room where suspects are paraded under powerful electric lights shining through a screen, they give attorneys and deputies an opportunity to "listen in" on the prisoners' talk. Detectives are stationed in a room removed from the shadow box.



Model of the Diving Bell for Submarine Rescues, with Small Craft to Show Method of Connecting

DIVING BELL FOR SUBMARINES TO AID IN RESCUES

For rescuing men trapped in submarines, two eastern inventors have devised a diving bell that can be lowered to the sunken craft, screwed to a special porthole in the submarine and so afford a means of escape for the occupants. From six to ten men can be accommodated in the bell at one time.

SCULPTOR WORKS SIX YEARS ON WAR MEMORIAL

One of the most elaborate stone carvings in this country is under way on the Elks memorial building in Chicago, where a 170-foot panorama of War and Peace is being chiseled as a border around the front of the structure. It is the work of Adolph A. Weinman, who spent nearly four years in preparing the plaster models and in making studies for the huge bas-reliefs. One-half of the work has just been completed after a year of carving, and the other half will be finished in the summer of 1929. Scores of figures, each cut in great detail, appear in the designs. The panorama of War, already finished, depicts Satan and Gossip starting baseless rumors to incite a conflict. Greed clutches his money bags and seeks protection behind the throne, while the ruler signals his heralds to sound the call to arms. The dogs of war are unleashed and stalwart men march forth to battle. Scenes of carnage are depicted and finally Victory emerges in triumph to receive the evergreen sprig of immortality, offered by Truth. The panorama of Peace will be represented in symbolic tableaux. The work will cost approximately $120,000.

Close View of One of the Stone Figures in the Panorama of War on the Elks Memorial; a Pageant of Peace Is Being Carved Opposite

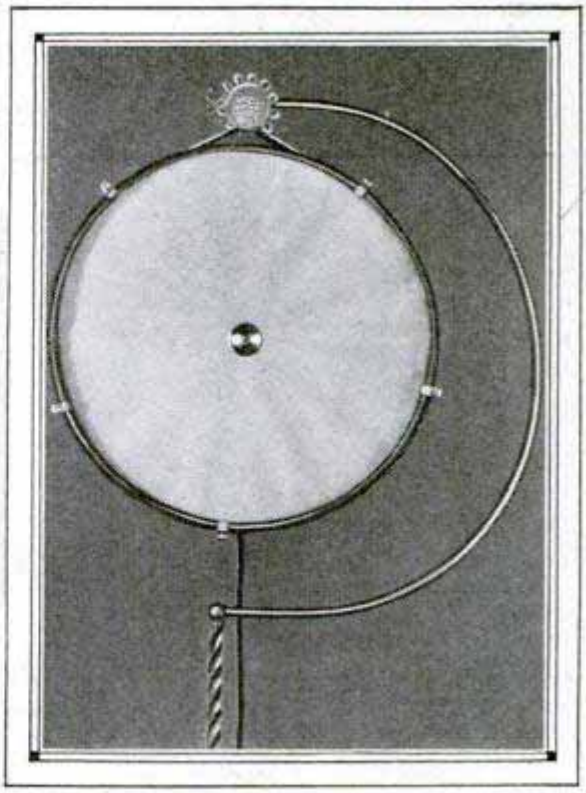
IMPROVED NEON ARC LIGHT TO AID AVIATORS

The brilliant red rays of neon-gas light that penetrate fog will be better adapted to use on airplane landing fields and other places, it is believed, through the introduction of an improved tube for producing the light. By means of an additional electric circuit, the cathode or electrode, through which the current passes into the tube, is heated, giving off electrons that cause the neon gas to glow and making it unnecessary to have such high voltages as are required in the older tubes. In the opinion of Dr. J. D. Forney, who worked with Dr. Clifton F. Found in preparing the new tube, the light should be useful in photography when combined with the mercury-vapor light.

¶Thirteen species of rattlesnakes are known in the United States.

MAKE THIS EFFECTIVE DRUM SPEAKER

By H·C·McKay



THE interest in speakers of the tension-diaphragm type is growing because of the remarkable fidelity with which the entire range of sound is reproduced. One of the principal objections is the awkward size and shape, which make it rather difficult to house the instrument attractively if the console is not large enough to take the diaphragm. The author, desiring to experiment with a loud speaker of this type, hit upon the toy-drum and cage-stand idea described in this article as a novel solution of the problem. The use of cloth for the diaphragms in the speakers of this type has several disadvantages and the skin head of the drum suggested a good substitute.

A drum of good size can be purchased at a reasonable price. It should have at least one real skin head and should be fitted with metal strainer bars instead of the leather type, so that equal tension may be maintained. In addition to the drum and birdcage stand, the only other materials necessary are: a piece of thin wood, about ⅜ in. thick by 3 in. wide and long enough to extend across one face of the drum; a heavy-duty cone-speaker unit similar to the types shown on page 298, and two heavy conical metal disks with a chuck and threaded bushing to anchor the disk on the thrust rod for the rear diaphragm. Metal disks with chuck and bushing are now available for speakers of this type; the thrust rod is furnished with the cone-speaker unit, is threaded at the apex end for a locking nut and is either screwed into the vibrating unit or dropped into a small hole in the vibrating member, where it is held by

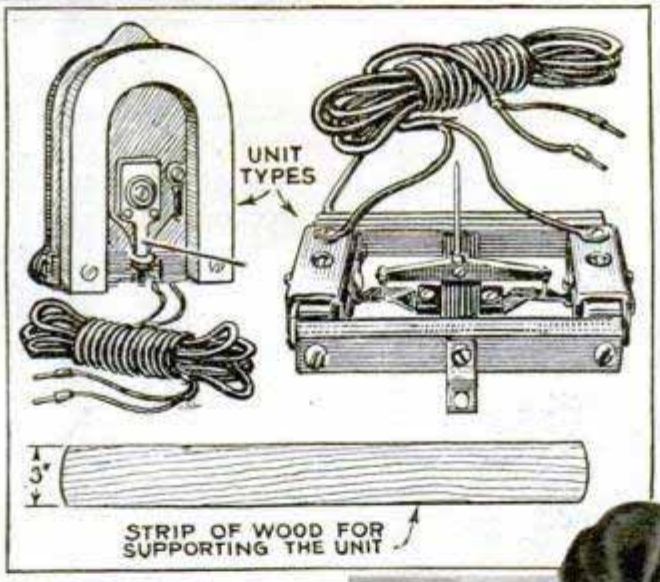
Taking the Drum Apart; the Apex Shields and Picture Cords Are Shown at the Right

means of a setscrew.

The photo on page 297 shows the necessary materials assembled before construction is started, the first step being to dismount the drum. The tension, or strainer, bars and the heads are then loosened and removed and the hoops lifted off. Usually drums of the less expensive type have one skin and one fiber, or parchment-paper, head. A small hole is punched in the exact center of the paper head, using great care that the hole is properly located and just large enough to permit the thrust rod of the speaker unit to pass through it.

Next the skin head is placed over a large pan, with the rim up as shown in the bottom photo on this page. A dishpan was used by the author and happened to be just the right size for the purpose. Now pour ½ pt. or so of warm water into the top of the skin head and let it stand until the head is thoroughly soaked, which will require only a few moments. Then, with a sharp awl, a hole is pierced in the exact center of the head. The water will drain off through this hole, leaving the upright edges of the head dry. The wet skin is mopped with a towel or other absorbent cloth until the surface is dry, leaving the head soft and pliable and considerably stretched.

The paper head is placed over the shell of the drum, and the thrust rod of the speaker unit, with the chuck and bushing disk slipped back toward the unit end, is ready for the paper diaphragm. In some cases the metal disk with the chuck is designed so that it may be mounted directly on the diaphragm. In either case the conical metal disk for the paper diaphragm must be placed so that the holding surface is toward the apex, as shown in the top photo and sectional diagram on page 299. The thrust rod is slipped through this disk on the paper diaphragm, and you are ready to place the skin head in position on the shell of the drum. The centers of the heads, with the metal disk in position on the skin head, are pushed together until the rod protrudes through the front disk; a small hexagon nut is then

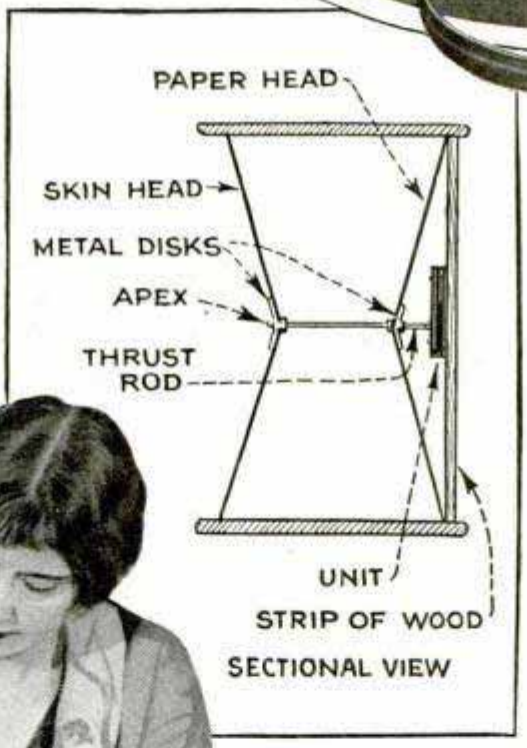


Top, Drum Dismounted Ready for Preparing the Heads; Center, Two Suitable Standard Cone Units and Detail of the Wooden Supporting Strip; Bottom, Pouring Warm Water into the Head, to Soften the Skin

screwed in place on the end of the rod, or apex, and the two heads will now retain their positions upon the drum shell. If trouble is encountered in coupling the heads on the rod, loosen the chuck bushing on the end back of the paper diaphragm and readjust it so that the apex nut may be screwed in position. Any extra tension required may then be obtained by screwing the nut down.

The next step is to apply the hoops and strainer bars. When this is done, the drum will appear as shown in the bottom photo. This completes the construction of the speaker itself; the strainer bars are tightened barely enough to hold them in place and the drum is then set away in a dry place for 24 hours. At the end of this time, the skin head should be thoroughly tight and dry. If the work has been properly done, rubbing the finger over the head will produce a loud rasping sound, and both heads will be under tension owing to the drying of the skin.

The wood piece is now cut and the ends rounded so that it will just fit in the hoop on the side of the drum bearing the paper head. The cone-speaker unit is mounted upon this strip with wood



Top, Assembling the Speaker and Connecting the Heads; Center, Sectional Diagram Showing the Method of Connecting the Heads and Mounting the Cone-Speaker Unit; Bottom, Stretching the Heads

screws as shown in the sectional diagram. The proper location of the speaker unit on the wood strip is important; therefore, see that the unit is so placed that the thrust rod may be fastened to the vibrating element without subjecting the rod to any side strain. The wood strip is screwed in position on the drum shell as shown in the photo on page 300, and the thrust rod secured to the unit by means of the setscrew. If the thrust rod is permanently fastened to the speaker unit, it will, of course, be necessary to push it through the diaphragms and secure it at the apex after the board is in position, the actual method varying according to the type of metal disks used and the design of the speaker unit.

A pair of picture cords and hangers of the rosette type serve to support the drum speaker on the birdcage stand. If a stand of the type shown is not available, a metal bracket projecting from the wall at any

Rear View of Completed Drum Speaker Showing the Wooden Strip Supporting the Speaker Unit

convenient point will answer as well. The diaphragm may be decorated with water colors if desired. Do not use heavy-bodied pigments for this purpose, as they might interfere with the acoustic properties of the diaphragm, particularly if they start to peel. Transfers or decalcomania also may be used to good advantage for decorative effects.

Speakers of this type are supersensitive to vibrations owing to the fact that the diaphragm is under stress at all times; see that there is no loss of energy due to a whipping or side motion of the thrust rod. The speaker units suggested operate efficiently with any B-voltage either with or without power tubes.

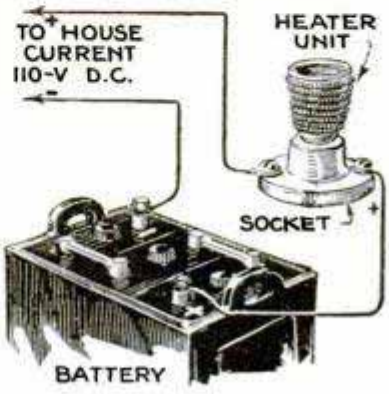
¶Popular Mechanics' radio department offers its information service free to all readers of the magazine.

Good Tuning Devices Important

The tuning devices in a radio receiver handle the high-frequency energy which is elusive compared with the audio, or low-frequency, energy following the detector. These devices include antenna coils, r.f. transformers, fixed and variable condensers and tickler or feedback coils. These parts must be selected with great care and only standard tested devices used, as nothing but the best materials and workmanship will produce the results now demanded by the critical broadcast listener. Good low-loss variable condensers should be strongly built and easily adjusted; fixed condensers of the mica-insulated type in molded bakelite are now available and are dependable. When wiring the r.f. end of the receiver, space the coils 4 or 5 in. apart, if possible, and keep the fields at right angles. Shielding is advisable, and, if convenient, each section should be entirely inclosed. If this is impossible, owing to the nature of the assembly, use shielding plates mounted between the units. Excellent aluminum shields of the single-panel and knock-down box type are now available in a variety of sizes. It should be remembered also that it is good practice to connect the stationary plates of the variable condensers to the grid circuit of the tube, to avoid hand-capacity effects. Keep all grid and plate leads as short as possible and well separated; do not parellel these leads and keep all wiring carrying r.f. current away from the filament wiring.

Charging Batteries from D. C. Supply

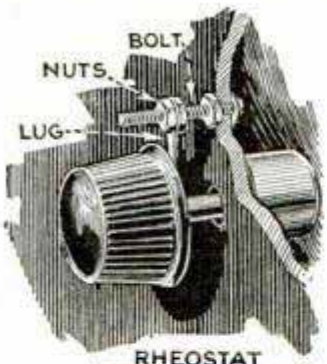
The simple arrangement shown in the sketch provides a method of charging storage batteries from a 110-volt d.c. line. The input is controlled by an ordinary electric-heater unit mounted in a porcelain-base lamp socket and the charging rate is about 7 amp. The heater unit is connected in series with the



positive line, which may be identified by holding the terminals about ½ in. apart in a glass of water in which a pinch of salt has been dissolved, the terminal causing the least disturbance in the solution being positive. A device of this kind cannot be used with a.c. current. A cheap ammeter of the auto type should be placed in series with one side of the line for checking the charging rate. The heater unit should be mounted on an asbestos pad and in a location where the heat generated will do no harm.

Safety Stop for Screw-In Rheostat

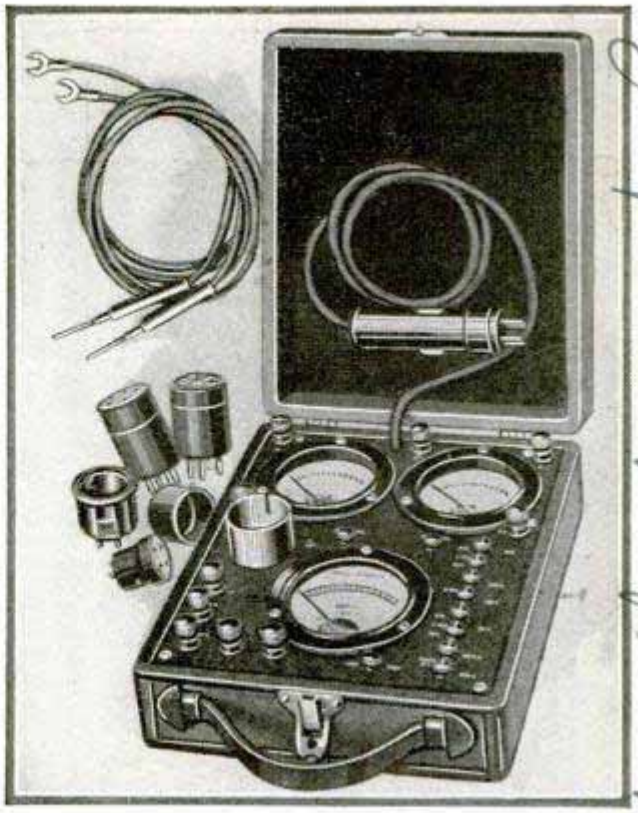
Rheostats of the screw-in, or carbon, type should be provided with a safety stop when used with tubes of the 199-type. They are very efficient but when used with the 3-volt tubes some means of knowing just how far to screw them in or out to obtain the required voltage, is necessary. A machine screw, about ¾ in. long, mounted on the panel directly over the rheostat knob and just high enough so that the knob will clear the nuts when turned in, provides an adjustable mounting for a long soldering lug which acts as a safety stop. The machine screw is secured against the panel with one nut, and the soldering lug is held in the desired position by means of two additional nuts. The correct tube voltage is found by means of a voltmeter held across the filament terminals of the tube socket; the lug is then adjusted on the screw to stop the knob at this position and the nuts are locked.



RHEOSTAT (TURN IN AND OUT) VARIETY

Reducing Power-Line Pick-Ups

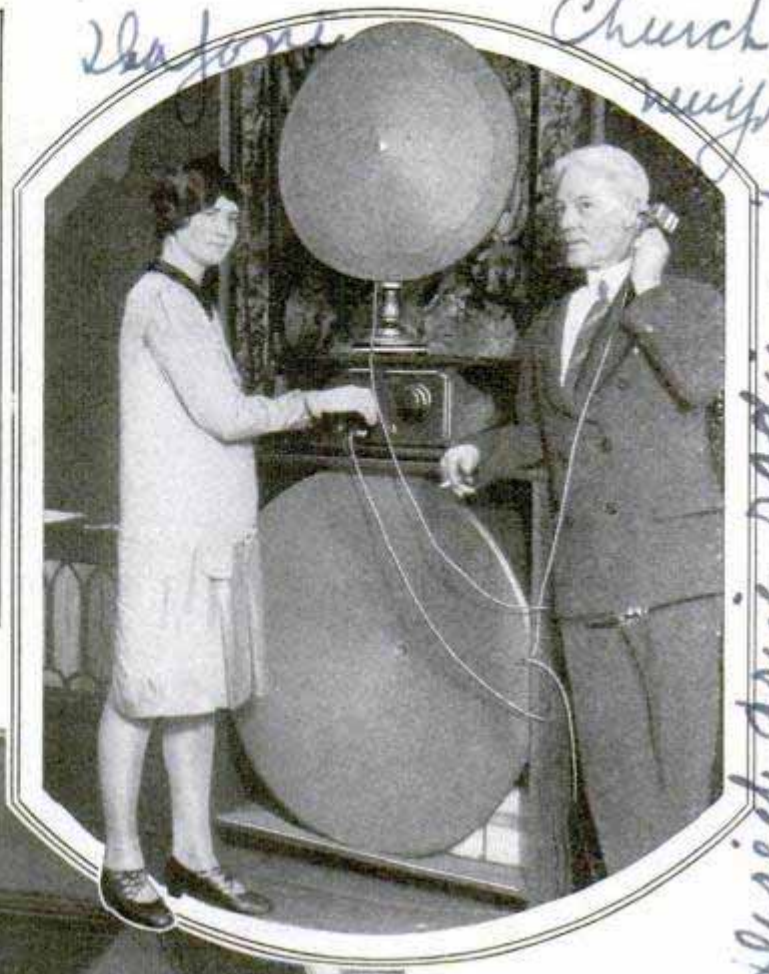
Broad tuning is frequently caused by power-line pick-up when a receiver is operated with a socket-power device. It may be caused by the power line acting as an aerial and ground system, owing to the manner in which the plug is placed in the wall socket. Reversing the plug will usually eliminate the trouble.

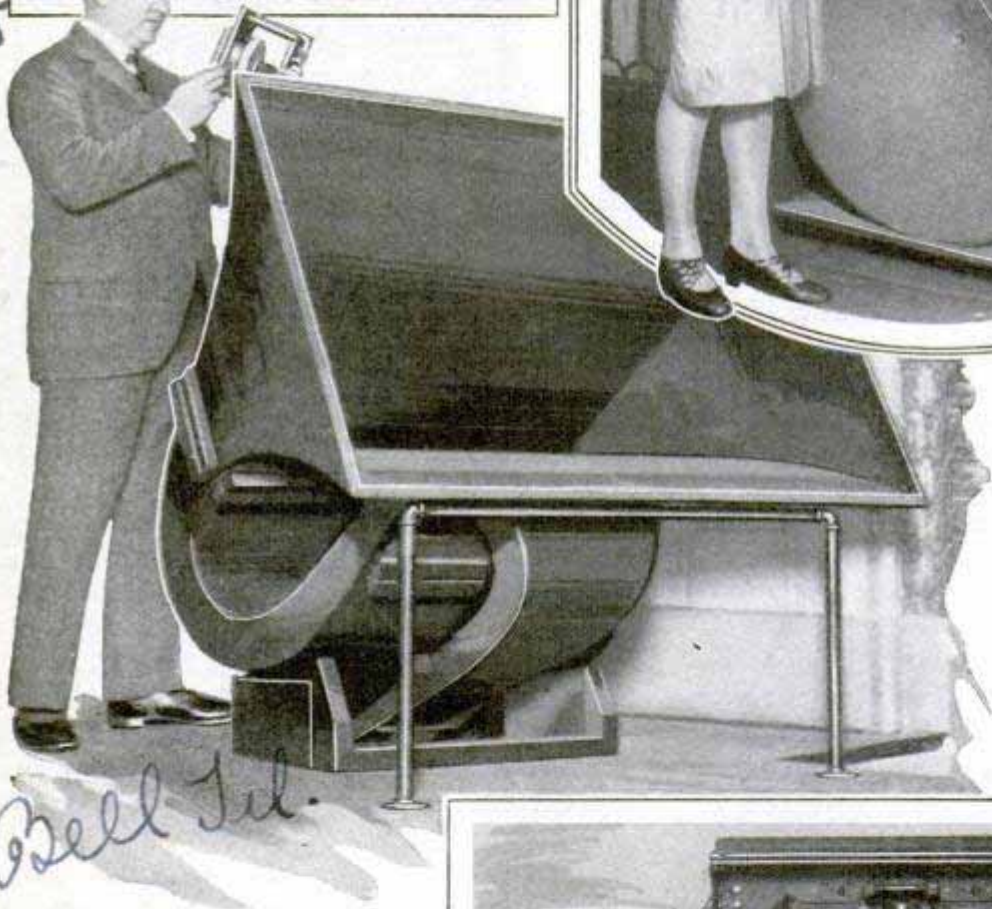

Combination Test Set for Direct and Alternating Current Tubes with Adapters and Other Accessories

Combination A. C. and D. C. Test Set

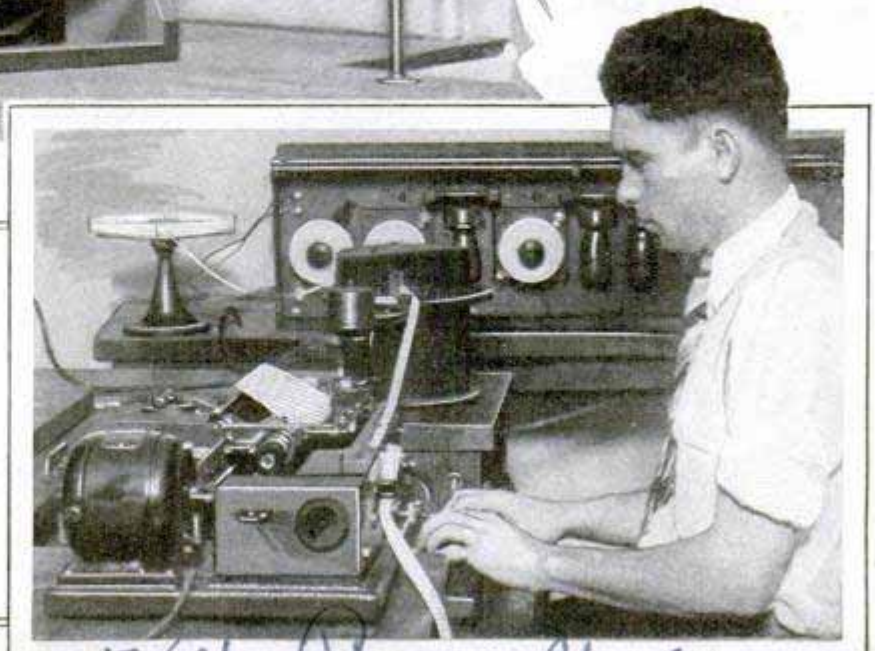
The popularity of sets using a.c. tubes has brought many new problems to the experimenter and radio-service man. The new set-testing outfit shown was specially designed to make simple and highly efficient tests possible where either a.c. or d.c. is employed. In operating the combination test set, a tube is removed from the receiver and the plug inserted into that socket. Adapters of various types are supplied so that sets employing any of the standard tubes or tubes of the old type may be tested. Provision is also made for certain tests on the UY five-prong base combination. Binding posts are supplied so that tubes having indirectly heated filaments with terminals at the top may also be handled. The meter at upper left is an 0 to 150-volt a.c. instrument with binding posts for checking line voltage. The upper right-hand instrument is an a.c. voltmeter with a range of 3 and 12 volts, so that readings may be had on the various a.c. filaments now in use. Plainly marked and easily operated push buttons are supplied for connecting either of these low readings to the filament leads from the plug, so that readings of true filament voltage may be taken rapidly.

Facts and Fads for Radio Fans





Upper Left, Photo-Radio Receiver Recording in New York a Signed Letter Transmitted from Paris; Above, a New Device, Recently Tried at the New York Institute for the Deaf and Dumb, Enabled the Students to Hear an Entire Radio Program for the First Time; S. A. Dickerson Is Shown Demonstrating the Device



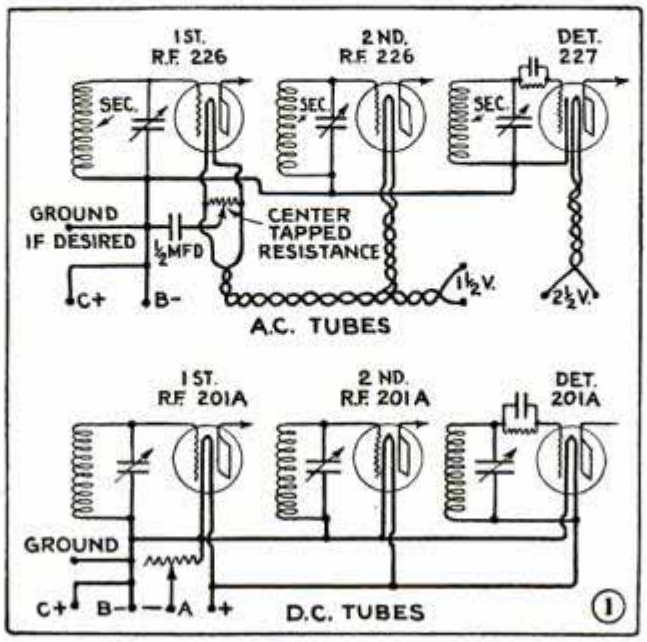
Above, the First Telephone and the Latest Loud Speaker Utilized to Demonstrate the Development of Electrical Science at the New York Meeting of the Engineers' Society; Sergius P. Grace Is Speaking through a Model of Bell's First Telephone, His Voice Being Amplified 100,000 Times by the Giant Speaker; Right, Navy-Department Operator Receiving Radio Messages at a Speed of Seventy-Five Words per Minute, the Recorder at the Right Registering the Message as a Wavy Line

Five ways to ELECTRIFY YOUR SET

by Frank L. Brittin

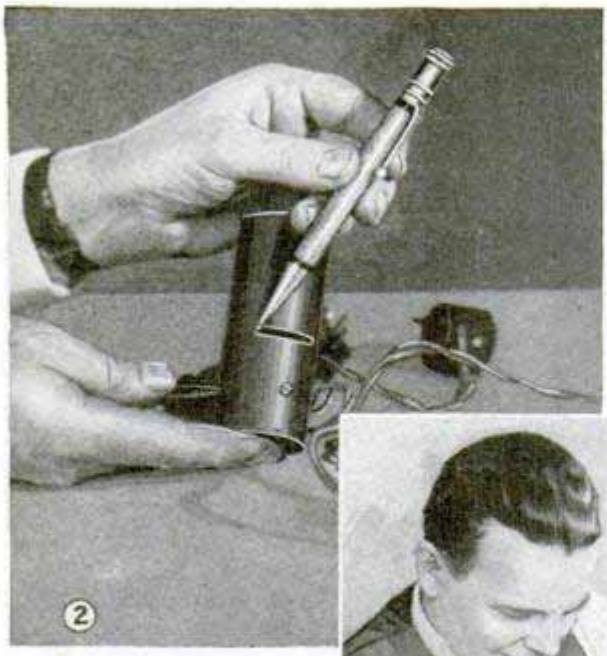
MANUFACTURERS of tubes, transformers, cabled harness and sockets have pooled their efforts to simplify the changes necessary in standard battery-operated sets to adapt them for the use of the new a.c. tubes. The introduction of these tubes had a rather disturbing effect at first, due to a lack of understanding on the part of the public, who, of course, did not take kindly to the idea of junking perfectly good sets in order to use the new tubes. When it is understood that the change involves the installation of the proper sockets, and the rewiring of the filament circuit only, and that suitable devices for the purpose are now available, the job loses its formidable aspect. As there are a number of methods now in use and several new types of a.c. tubes on the market, it is not possible to go into detail as to the merits of each. The reader should understand that a change to a.c. tubes does not necessarily add to the efficiency of his set, and that these tubes have been developed simply as a convenient method of doing away with the storage battery and the charger.

Our readers are familiar with the Arcturus type employed in the All-Electric-Five receiver described in the April, 1928, issue, hence this will not be discussed now. The RCA and Cunningham *226* and *227* or *326* and *327*-types are of two varieties, one having a directly heated filament and the other containing a separate heater element which is not directly connected into the receiver circuit. The *226*-type employs a standard four-prong base, while the detector *227*-type, with the separate heater, has five prongs in the base. In other types, filament-heater wires are brought out at the top of the tube or are taken from the sides of a special base.



When using raw a.c. current in a sensitive receiver, it is necessary to keep these wires as far as possible from the grid and plate leads, and the filament wires should be twisted lampcords or similar cable of sufficient current-carrying capacity for the tubes.

Ordinary rheostats are not used in the filament circuit. If a control is desired, there is an

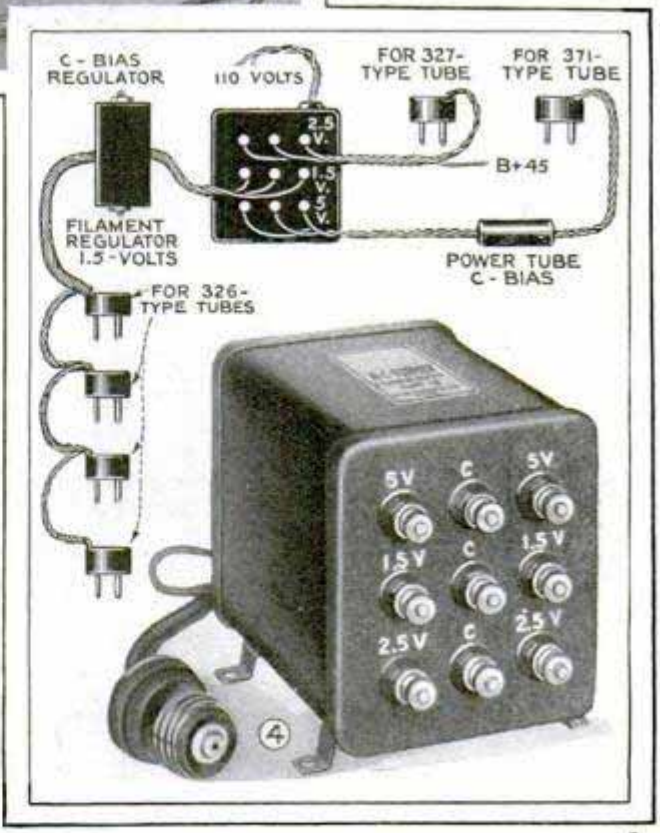


automatic device for the purpose of protecting the tube, or a rheostat of proper type may be cut into the 110-volt a.c. supply line which also contains a power switch. In order that the 110-volt current may be cut to the correct values, a step-down transformer is used.

The 226 or amplifier tubes require 1½ volts, while the detector or 227-type must be supplied with 2½ volts. The positive C-battery connections and the negative-B go to the grid-return lead instead of to the filament circuit, as in d.c. receivers. The comparative circuits, shown in heavy lines in Fig. 1, indicate where the filament wiring differs. Note that a .5-mfd. by-pass condenser is used to prevent a short circuit that might result from the grounding of the lighting system. The filament connection to the 226-type tubes is provided by a center-tapped resistance obtainable from any dealer in radio supplies; this is connected as shown in the diagram. A slight hum is usually present in a.c. receivers but is not audible when a station is tuned in.

These mechanical and electrical differences in receivers originally designed for d.c. tubes are provided for by means of special socket adapters which insulate the tubes from the original filament terminals in the sockets and provide new filament or heater leads.

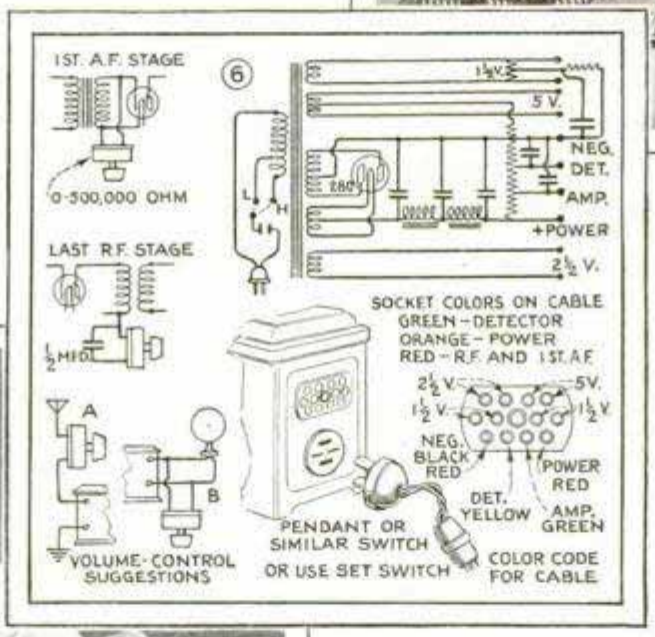
Figs. 2, 3 and 4 show one type of adapter harness and special step-down transformer, making possible the conversion of practically any battery-operated set without changing any of the wires in the set itself. The d.c. tubes are simply removed from the set, the A and C-batteries disconnected and the adapters supplied with the harness inserted in the tube sockets, as shown in Fig. 3. The ends of the harness are labeled for the proper terminals on the step-down transformer, as shown in the diagram, and are connected accordingly. Since the A and C-batteries are disconnected, the A-battery posts on the set remain unused.



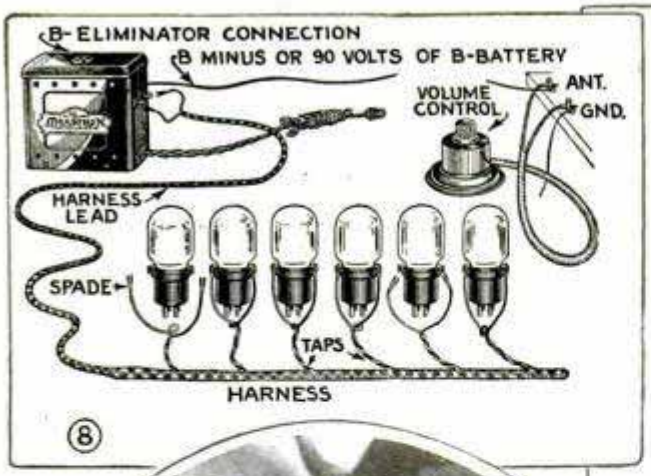
The C-negative terminals or binding posts are connected to the C-positive binding

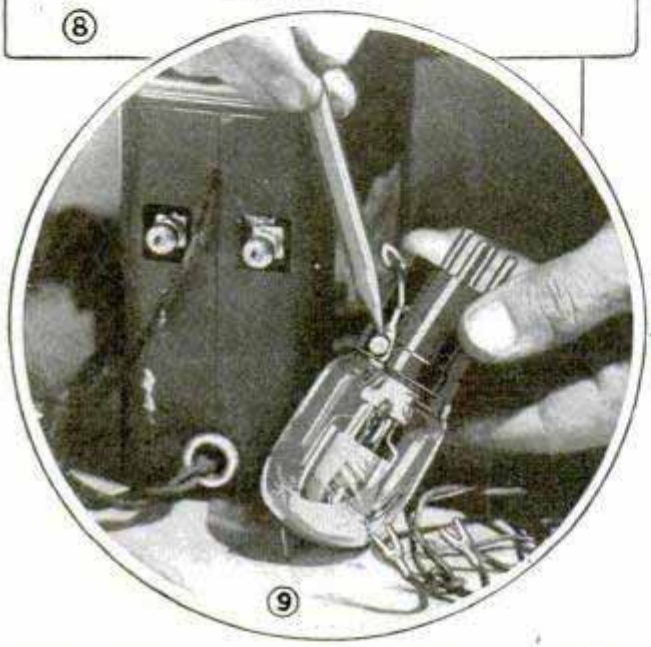
posts with a short piece of wire, to complete the circuit, and the set is ready to operate without any batteries whatever, if a B-eliminator is used. The variable resistance or C-bias regulator, shown in Fig. 2, is connected in series with the grid lead. By adjusting this resistance, the C-bias voltage applied to these tubes may be kept at any desired value. The detector section of the adapter harness and that for the power tube are separate units, because there should be no electrical connection between them. The power-tube part of the harness has a small container unit housing the resistor to bias the power tube that provides the necessary C-voltage. These harnesses are supplied in different types, using any standard filament transformer and any standard B-eliminator.

In Figs. 5, 6 and 7 is illustrated a combination A, B and C-converter, which is furnished either in kit form or mounted in an attractive steel container ready to operate. The 226 and 227-type tubes previously mentioned, as well as the 171 power tube, are used in the model shown, and another model is designed for use with the Arcturus tubes. The B-power unit delivers 40 milliamp. at 180 volts and employs a full-wave filament-type rectifier tube in the socket indicated in Fig. 7. A C-voltage of 45 volts is also furnished in this unit. A converter harness, with the proper adapters, is also available and terminates in the multiple plug indicated in Fig. 5. If necessary to provide a volume control, the suggestions given in the diagram (Fig. 6) may be followed with good results. The schematic diagram of the power supply and the harness-terminal connections at the multiple plug are also shown.



In Fig 8 is illustrated what probably offers the quickest change to a.c. operation, the entire outfit coming in a complete kit and including the tubes. In applying this kit there are no changes or new connections to be made; each tube has on its base two special filament or





heater connectors, as pointed out in Fig. 9. Connecting spades are arranged on the harness and are slipped over the terminals as indicated. The heater extension connections coming from the cable are twisted into pairs, and no attention whatever is given to polarity connections. The special tubes employed all require the same heater voltage. The detector tube is plainly marked and should, of course, go in the detector socket of the set. The amplifier tubes all have the same characteristics and no distinction is made for their positions. The adapters are plugged into the set sockets and the tubes inserted; the B-eliminator, if one is used, is plugged directly into the receptacle at the top of the transformer unit, and the power is then controlled entirely by the light-socket switch. With this apparatus, it is possible to change the standard five or six-tube set in less than five minutes.

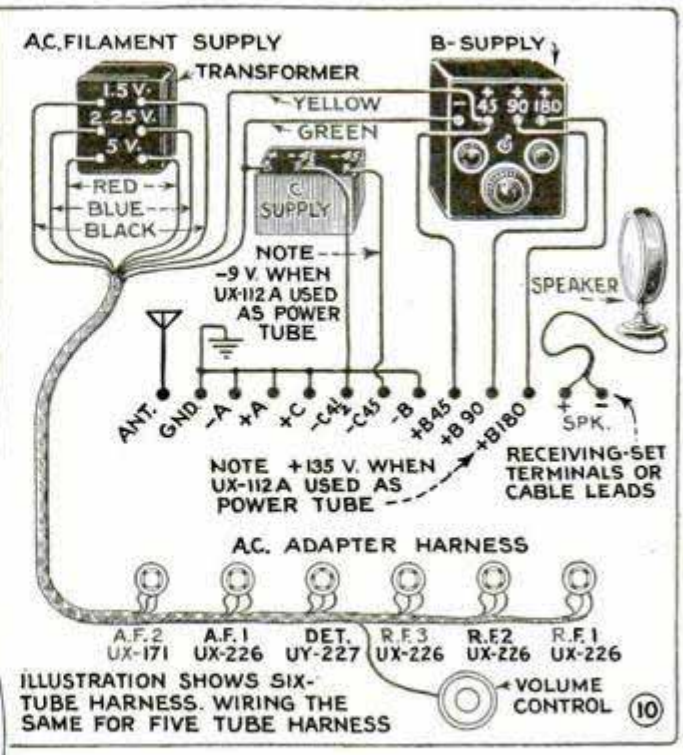
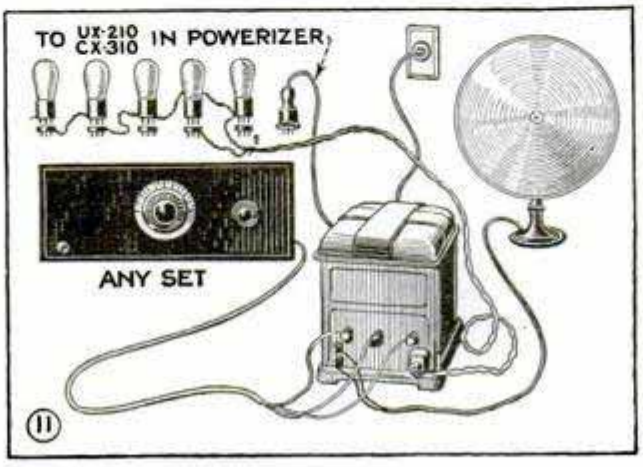


Fig. 10 shows an adapter harness and standard filament-heating transformer similar to others previously described for adapting storage-battery-operated sets to use the type 226 and 227-tubes; but in this case the C-power supply is obtained with the usual C-battery.

The device shown in Fig. 11 goes a step farther than any of the other adapters. Complete a.c. harness, A and B-power supply and power amplification for a UX-210 or CX-310 tube are provided.

Antenna Protects Building

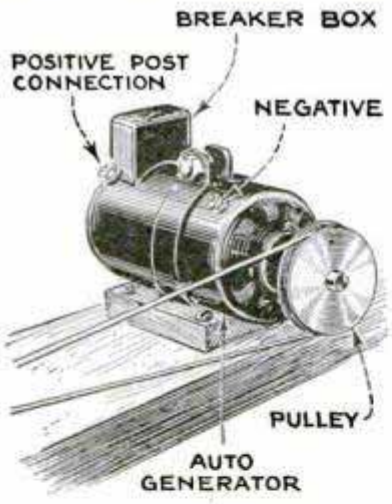
A properly installed antenna should always be provided with a lightning arrester connected between it and ground. Devices of this type approved by the insurance underwriters are not expensive and may be obtained from any dealer in radio supplies. The antenna, so protected, not only prevents damage to the set but also provides



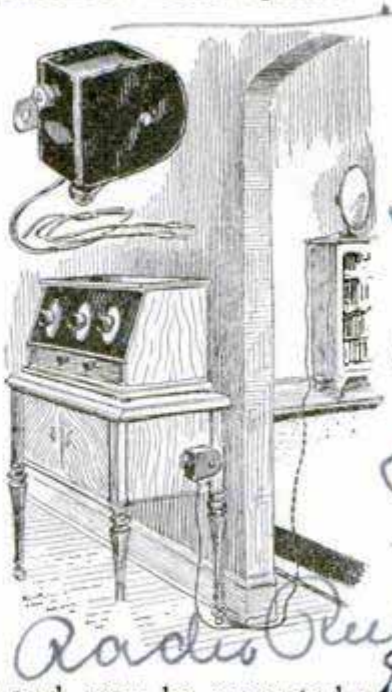
protection for the building. It is preferable that the ground lead from the lightning arrester be kept outside, although this is not insisted upon. A lightning arrester is safer than a switch, since the latter is manually operated and the owner may forget to throw it to the ground when the set is not in use.

Old Auto Generator as Battery Charger

A very good battery charger can be made for about $2 from parts that may be obtained from an auto junk dealer. Several weeks ago I made up my mind to do away with the trouble, cost and inconvenience of taking the battery to the service station, and this is how I went about it: The ¼-hp. electric motor used about the house for general purposes caught my eye, suggesting that it might be employed for charging purposes in connection with an old auto generator. A trip to the local dealer in junked cars resulted in the purchase of a generator, with a breaker box on it, and an ammeter for $1.50. Upon my return home, I made a wooden pulley, 3 in. in diameter, which happened to be the correct size for the speed of the generator. The latter was mounted at one end of a 3-ft. plank, about 1 ft. wide, as shown, and the motor on the other end. The motor was then belted to the generator and the battery connected to the terminals indicated, with the ammeter in one side of the line. The outfit worked fine with the exception that the charging rate was a little high, according to the ammeter, but this was adjusted by means of a setscrew directly beneath the breaker box. The alteration in the rate may also be obtained by changing the size of the wooden pulley to regulate the speed. The breaker box acts as a safety device and the installation is extremely simple.—E. D. Fahling, Tama, Iowa.



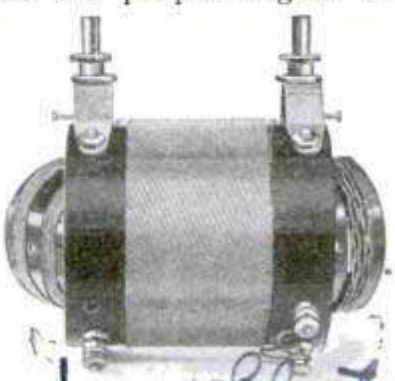
Self-Winding Reel for Loud Speaker



A self-winding reel with 25 ft. of cord is now available for quickly placing the loud speaker in an adjoining room, or changing the speaker to various locations around the same room. The device is finished in nickel or brown mahogany enamel and may be mounted at any convenient point on or near the set. Lengths of cord may be added by means of small cord-tip couplers.

New Coil Has Twin Rotors

The twin-rotor coil shown in the illustration is now available for set builders and provides a means of varying the coupling between the primary and secondary to suit the conditions peculiar to any location. As three-circuit tuners have a primary, secondary and tickler winding, and, in the usual tuner of the three-circuit type, the primary and secondary windings are stationary, the fixed coupling is determined by the distance between these coils. The set builder must choose between a tight coupling that will produce good signal volume but poor selectivity, or place the coils far apart and get good selectivity at the sacrifice of volume. The nearness of powerful broadcasting stations will, of course, determine the proper degree of coupling. The problem is solved by the double-rotor coil, as the primary is wound on one of the rotors and the coupling may be varied as desired.



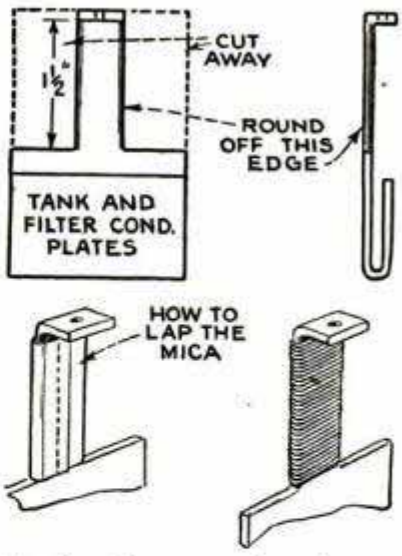
Radio Tables for the New Electric Sets, Showing Two Arrangements

Tables for Electric Sets

Electrically operated radio sets require little room, and the attractive tables shown in the photo are small enough to fit almost anywhere, yet sufficiently large to accommodate not only the complete radio set but a row of books as well, if desired. Two suggestions for the installation are illustrated. The manufacturer also supplies a similar table provided with two book shelves below.

Electrolytic B-Eliminator Kink

When building electrolytic B-eliminators of the type described in the February, 1927, issue of Popular Mechanics, difficulty is often experienced in preventing overheating during the cell-forming process. It is almost impossible to find a rubber tape that will cling to the flat surface of the wide aluminum electrodes, as the liquid seems to creep up under the insulation, causing surface sparking, heating of the cells and pitting of the electrodes. The writer used several kinds of insulating preparations with varying success, but finally found a simple method that proved highly satisfactory. The details of this are shown in the sketch. Purchase some mica of the kind used in heating stoves and strip off layers until thin sheets are obtained; the thinner the sheets the better. Cut the upper part of all the aluminum plates to a width of ½ in., that is, all the portion to be insulated, and also both lead plates of the rectifier cells. Round the edges with a clean file, so that the mica will fit tightly against the metal, over the edges, without cracking. Coat each portion to be insulated with a good grade of insulating varnish, obtainable from any electrical-supply house. Cut a piece of paper long enough to go around this coated portion and slightly overlap, and use it as a pattern for cutting the mica to the correct size. When putting on the mica, use a narrow piece of heavy paper, about the thickness of a postal card, and lay this over the mica when bending it around the plate so as not to break the edges. Hold the mica in position and have someone tie it on the electrode in several places. When all electrodes are prepared in this manner, wrap heavy thread tightly over the mica, removing the temporary cords as you proceed with the winding, and tie both ends of the thread securely. Next coat the entire wrapped portion with the insulating varnish. Two or three coats should be applied, allowing each coat to dry thoroughly. The lead electrodes in the tank and filter condensers need no mica insulation and three or four coats of the insulating varnish will protect them sufficiently. Assemble the electrodes in their respective cells, where they can now be formed exactly as shown in the blueprint diagram No. 117. No further trouble from overheating will be experienced. The writer has used this eliminator almost every night for four or five hours during the past three months with very satisfactory results. The electrolyte has dropped only 1/32 in. during this time and no oil of any kind was used on top of the solution. The cells are as cool after four or five hours' service as when first turned on.—Theodore H. Hanson, Clinton, Iowa.

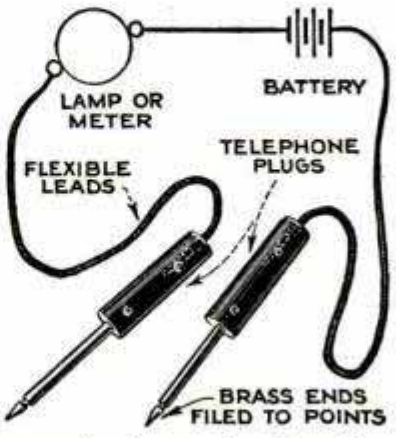


Soldering Lead to Lead

It is not an easy matter to solder lead to lead, but it can be done and such connections are sometimes advisable on storage batteries or other radio accessories. A good hot iron, well tinned, and some regular soldering acid are necessary. First clean the lead parts thoroughly by scraping. Place a small amount of the acid on the surface to be soldered and tin each piece separately by rubbing the hot iron, with solder, over the cleaned surface. Now place the pieces together and flow the solder in, taking great care that direct contact with the iron is on the solder and not on the lead. The shade of difference between the melting points of solder and lead makes this a rather ticklish operation, but with a little practice, good solid connections can be made. Where two flat pieces are to be joined, or a small flat piece to a heavier one, a small hole may be drilled through the thinner flat piece, and, after the surfaces to be joined are tinned, the point of the iron is applied through the hole. Turning the iron carefully in the hole and applying solder so that it will flow into the joint will produce an excellent connection, but practice is indispensable. Soldered connections on storage-battery terminals will hold nicely, but must be protected with vaseline or grease to prevent the battery acid from attacking the tin in the solder. If it is necessary to solder a wire to a lead terminal, first tin the lead and the wire and then join them by holding the hot iron on the wire.—Harry Saine, chief engineer, Station KQW, San Jose, Calif.

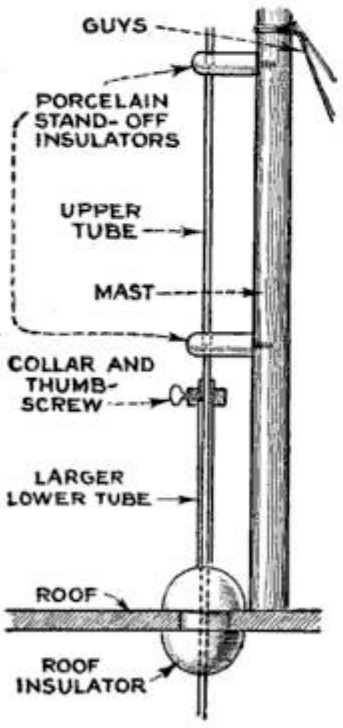
Test Points from Phone Plugs

Old telephone plugs may be used as shown in the sketch and make excellent testing points for checking circuits. No alteration in the plugs is needed, but it is a good idea to file or grind the ball ends to a blunt point. One long flexible lead, made from a length of telephone cord or similar insulated wire, is required for each plug. An old receiver cord with the outer cotton or silk covering removed will serve excellently. Since the long brass sleeve in the plug is not connected in the circuit, it does not matter if it touches any instrument while testing, but, if desired, it may be covered with rubber tubing. The lead is connected to the insulated portion of the plug that terminates in the bare pointed end. The usual circuit for continuity tests is shown in the sketch, and consists of a battery, and either a lamp or meter for the continuous circuit indicator.—H. R. Wallin, radio operator, Brooklyn, N. Y.



Building a Telescope Antenna

All amateurs working with short-wave transmitters have encountered difficulty in obtaining maximum radiation when shifting from one short-wave band to another. If the antenna is correct for the 80-meter band, it does not radiate properly on the 20 and 40-meter bands. The writer has worked out the telescope antenna shown in the sketch and found it a better method than cutting off, or splicing, a lead-in according to usual practice. The antenna is placed directly above the set, with the lower end threaded and screwed to the top of the roof insulator. This lower section consists of 8 ft. of ½-in. brass tubing. The upper part of the rig is made up of two 10-ft. sections of ½-in. brass tubing, held together by a threaded coupling. This part is held vertical by means of porcelain stand-off insulators mounted on one side of a strongly guyed 2 by 2-in. pine mast. A brass collar, turned in a lathe and tapped for a thumbscrew at one side, is slipped over the lower section near the top, a hole being drilled there to allow the thumbscrew to clamp the inside tube. When testing the installation on the various wave bands and finding the radiation about half what I think it should be, I slide the aerial up or down about 6 in. until the correct point for best results is located.—Harold S. Sykes, operator, Station KGAR, Tucson, Arizona.

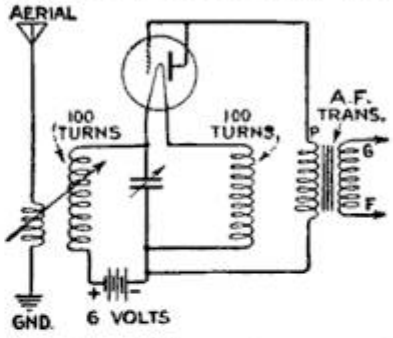


Prolonging Dry-Cell Life

Strictly speaking, there is no such thing as a "dry" cell, for the content is actually a moist paste which, when it becomes perfectly dry, causes the battery to become useless. In order to prevent undue drying out, such batteries should never be kept where there is too much heat and, by the same token, extreme cold may have a similar effect. Some radio amateurs make it a practice to coat all batteries with paraffin or wax to prevent access of air and thus delay drying out, while some of the better makes of dry B-batteries are entirely impregnated in wax for the same reason. Usually these batteries will last from two to three times as long as batteries which have not been treated. Dry cells should also be kept in an upright position at all times and the ordinary cell used for doorbell ringing will last much longer, if installed in this manner. The same thing holds true of dry B and C-batteries, which should be so placed that the cells, inside the casing, are vertical and not on their sides. Proper treatment of batteries will usually double their lives.—Wm. F. Crosby, engineer, Wireless Radio Corp., Brooklyn, N. Y.

Detector Circuit without B-Battery

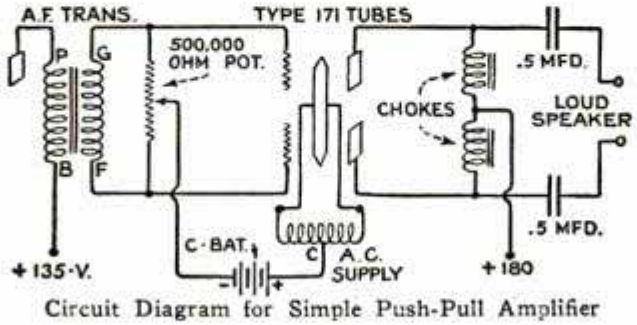
The accompanying diagram shows a new detector circuit employing a two-element tube, which may be any ordinary three-element type, such as the C-301A, with the plate and grid short-circuited. This circuit is unlike the DeForest and Fleming systems of early design and is of additional interest, owing to the fact that no B-battery is employed; in fact, the plate is given a slight negative potential by return to the negative side of the A-battery. It will be noted that the filament current flows through the inductances and that the emission of electrons from the filament and their flow to the plate are directly controlled by the r.f. fluctuations present at the high-potential end of the pair of tuning coils. Two coils are necessary to prevent the direct short-circuiting of the tuning condenser by the filament. The antenna coupler may be any standard type with the secondary rewound to 100 turns; the second coil in the filament cir-



cuit is also 100 turns. For those who wind their own coils, the following data may be useful: A .00035-mfd. variable condenser is employed in the circuit given and the coils are wound on a tube form, 2 in. in diameter, the wire being No. 24 d.c.c. If the condenser is .0005 mfd., use the same-size wire and tube and wind the coils 77 turns each. The primary coil at left depends on the length of aerial used; try 15 or 20 turns for this coil on the same-size form and either add or deduct turns until the set tunes sharply. This system of detection gives excellent results when employed with any standard radio set and prevents tube blocking which so often occurs with the grid-condenser and gridleak method. The quality of signal obtained is excellent and compares favorably with crystal detection.—L. J. Lesh, consulting engineer, Chicago.

An Inexpensive Push-Pull Amplifier

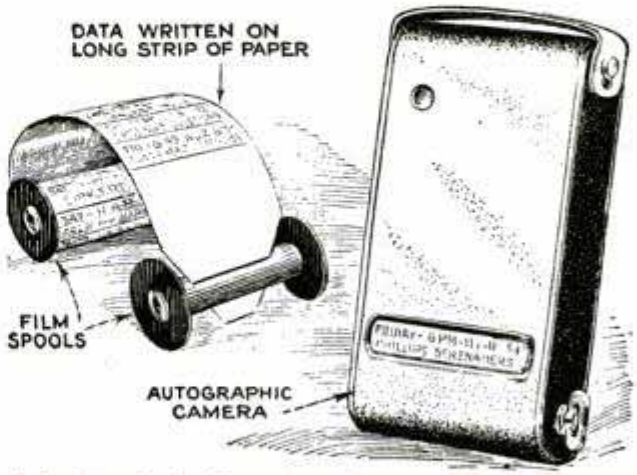
A good push-pull amplifier may be built at a very low cost, without the usual center-tapped transformers ordinarily required for this type. Select an audio-transformer of good make and use it as the input-transformer to the push-pull stage. A 500,000-ohm potentiometer is shunted across the secondary of the transformer as shown. The negative of the C-battery is connected to the center tap of the potentiometer to provide the negative bias for the grids of the push-puil tubes. The output circuit is composed of two Amerchokes, or autoformers, and two .5-mfd. condensers, which feed the loud speaker. Alternating current is used to light the filaments by means of any standard filament-heating transformer and there is no noticeable hum. The original amplifier built by the writer employed two UX-171 tubes. At present, an amplifier of this type, having two 50-watt tubes and feeding six large exponential horns, is being used for public-address work and is satisfactory in every respect.—M. J. Weiner, chief engineer, Station WODA, Paterson, N. J.



Circuit Diagram for Simple Push-Pull Amplifier

Handy Radio-Program Index

Radio listeners who are in the habit of selecting their programs in advance will find the idea illustrated in the sketch very



Left, Data Strip Wound on Spool Ready for Inserting in the Camera; Right, Strip in Position

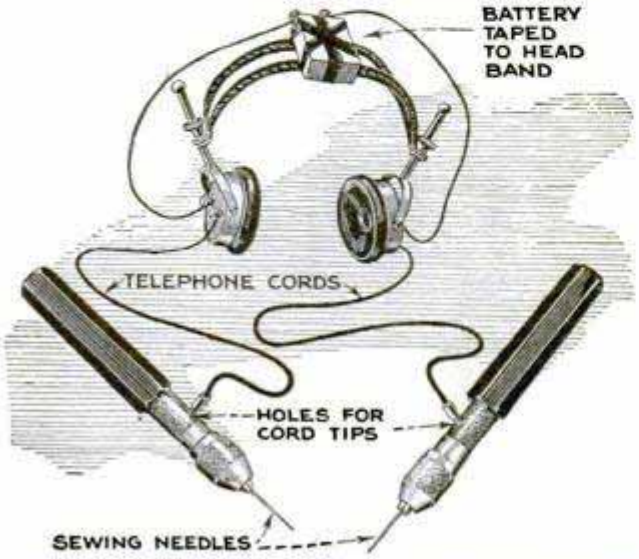
convenient for keeping such data. An autographic camera, available in most homes, is used. No change in it is necessary. A strip of white paper, several feet long, is cut to the width of the film and is wound on a spare spool. The programs selected are typed or written in pencil on this strip of paper along with the date, time, station and dial reading. When the list has been completed, the strip is rolled on the film spool, inserted in the camera and turned to position as shown. Any of the data inscribed may then be read through the slot by merely turning the film spool.—H. R. Wallin, radio operator, Brooklyn, N. Y.

Reducing Local Interference

The writer has found that much local interference can be reduced or eliminated by the simple expedient of disconnecting the ground lead from the set and shifting the aerial to the ground post. The coils in the set will usually pick up enough energy to bring in the signals, making reception possible under conditions that are often regarded as hopeless.—C. R. Yarger, chief engineer, Station KFNF, Shenandoah, Iowa.

Handy Radio-Testing Points

By combining two sewing needles, two small pin vises, one pair of headphones and a small flashlight battery, as shown in the sketch, a very handy outfit for testing open circuits in radio apparatus may be had at little expense. The battery is fastened to the headband with tape and is connected in series with one side of the phones. The pin vises should be provided with insulated handles, and small holes are drilled in the side of each metal shank to take the cord tips. When drilling these holes, first measure the latter and drill the holes slightly smaller, say, .001 in., to provide a friction fit. With ordinary needles in the pin vises, coils wound with fine wire may be penetrated and explored for open circuits in transformers and for other tests. A particular advantage of this combination is that nothing is destroyed in making the instrument.—J. McIntyre, Hartford, Conn.



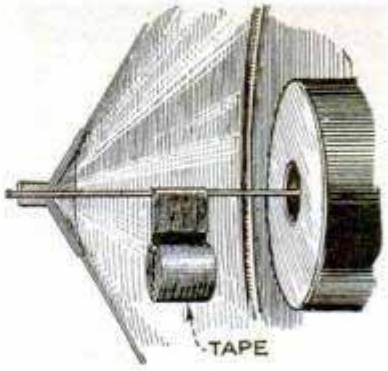
Testing Instrument Assembled from Needles, Pin Vises and a Headset, Showing Connections

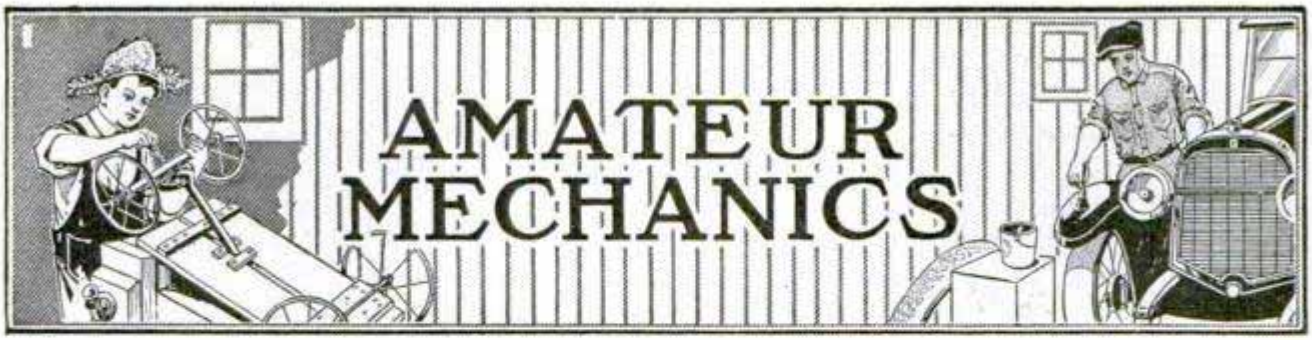
C-Voltage Depends on B-Voltage

If B-batteries are used to supply the plate current for a receiver, the voltage should be watched and the batteries discarded when each 45-volt block runs down to about 34 volts, or when that of each 22½-volt block drops to about 17. It is necessary to provide a proper relation between the C-voltage and B, or plate, voltage. It is generally known that while B-batteries run down in use, the C-battery loses practically no voltage in its entire life. This means that when the B-batteries are new, the proper C-battery is being used for best results, but just as soon as the B-voltage begins to drop, the C-voltage is greater than is needed. For example, if a power tube of the CX-112A type is operated with new B-batteries supplying a total of 135 volts and used with the recommended 9-volt C-bias, the current drawn by the tube is about 6 milliamp. If the B-batteries are allowed to run down to 34 volts per 45-volt unit, or a total of 102 volts, the current drain with an applied voltage of 102 volts in the plate circuit, and a negative grid bias of 9 volts, will be approximately 1 milliamp. Under such conditions, the tube will not operate at proper efficiency, but if the C-voltage is reduced in proportion, the amplifying efficiency of the tube can be maintained at a high level in spite of the lowered plate voltage. In the example mentioned, a reduction of C-voltage to 6 volts instead of 9 will cause a current flow of about 5 milliamp., at a plate voltage of 102. The same applies to the first audio stage; for instance, if 90 volts of B-battery is used and drops to, say, 68 volts, reduce the C-battery from 4½ to 3 volts for a 301A-tube.

A Practical Cone-Speaker Kink

There are few if any cone-type speakers which do not at one time or another develop a singing tone, owing, it has been found, simply to vibration of the driving pin. This interferes greatly with the diaphragm. The drawback may easily be overcome by the simple method shown in the sketch. Obtain some electricians' tape, wind up enough to make a roll about ½ in. in diameter and leave an end by which to fasten it to the pin, as shown, without touching the surface of the cone. This light weight will change the vibration period, and the general tone of the speaker over all frequencies will be appreciably improved.—L. H. Georger, Buffalo, N. Y.





A Plane for "Lindy Junior"

By HI SIBLEY, 1954 Brigden Pasadena Calif

THE boys of a generation ago believed that the most glorious career lay in becoming a fireman or a circus acrobat, but now, with such an idol as Lindbergh before them, they have turned to aviation with even greater enthusiasm. Here is something constructive that every boy should be encouraged in. Experts agree that aviation is still in its pin feathers, and that there is a promising future for all who take up flying as a career—particularly those of mechanical turn of mind.

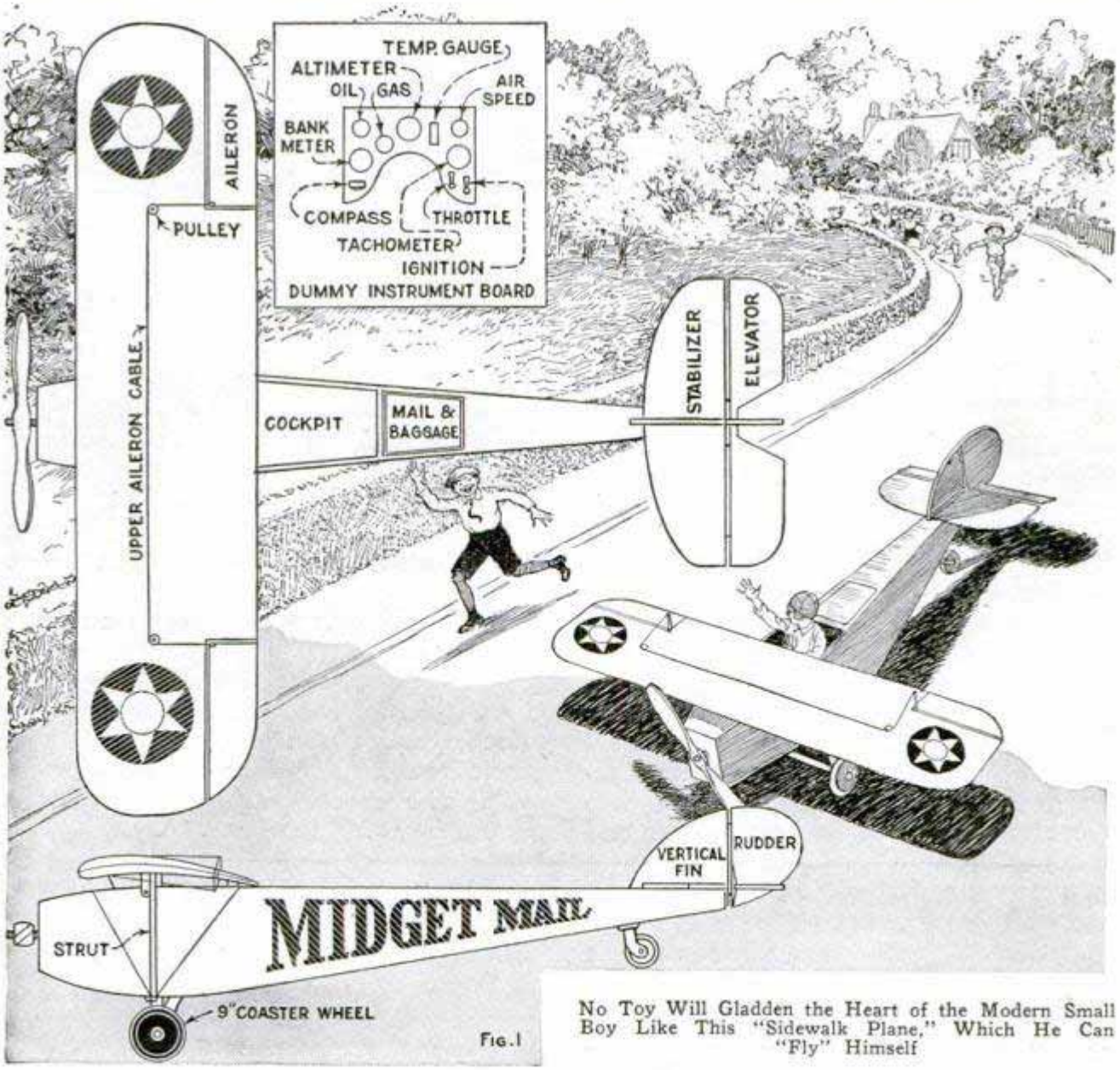


FIG. 1

No Toy Will Gladden the Heart of the Modern Small Boy Like This "Sidewalk Plane," Which He Can "Fly" Himself

Model planes are doing their part in a preliminary educational way, but to give the boy a more accurate concep-

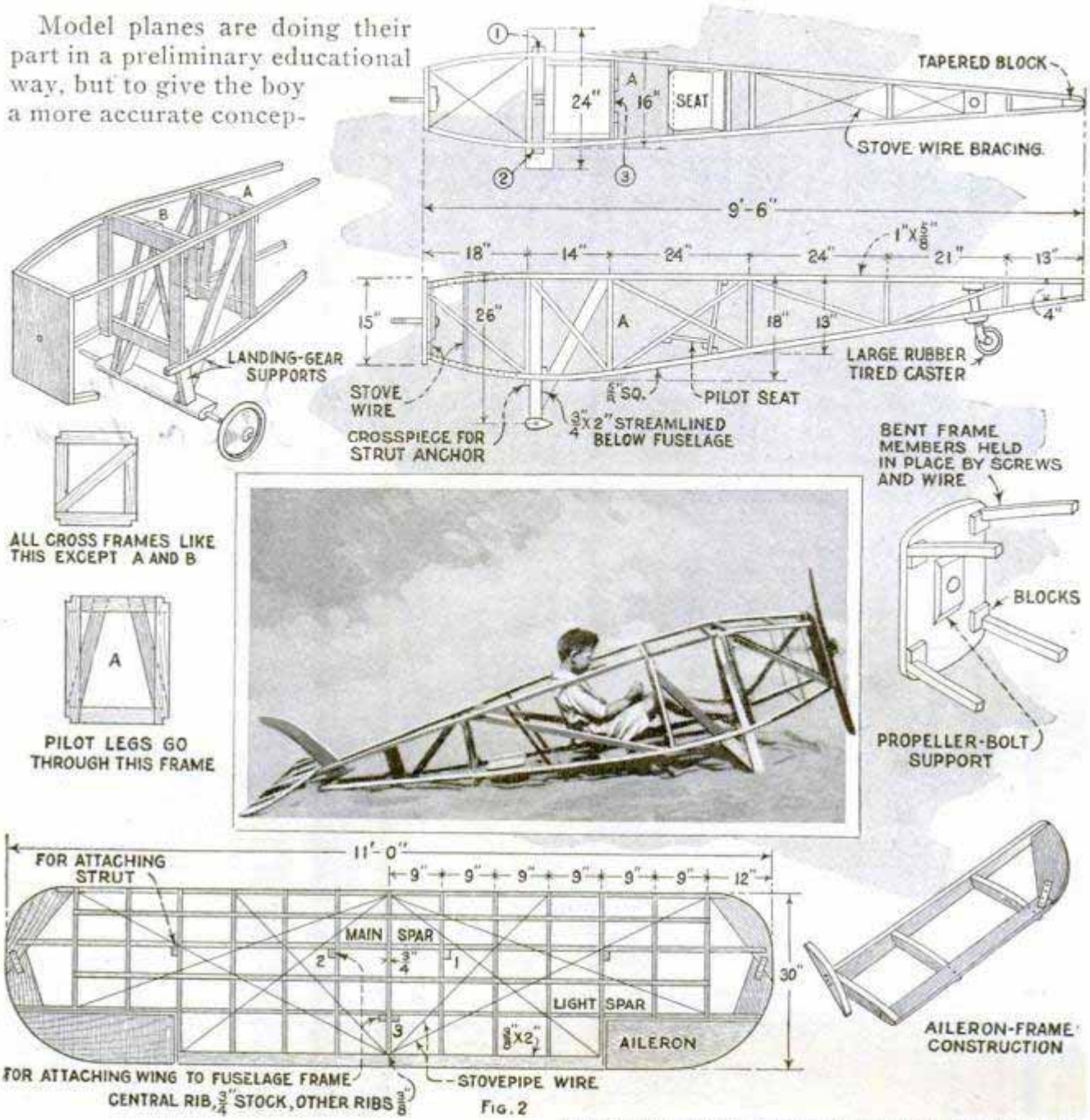
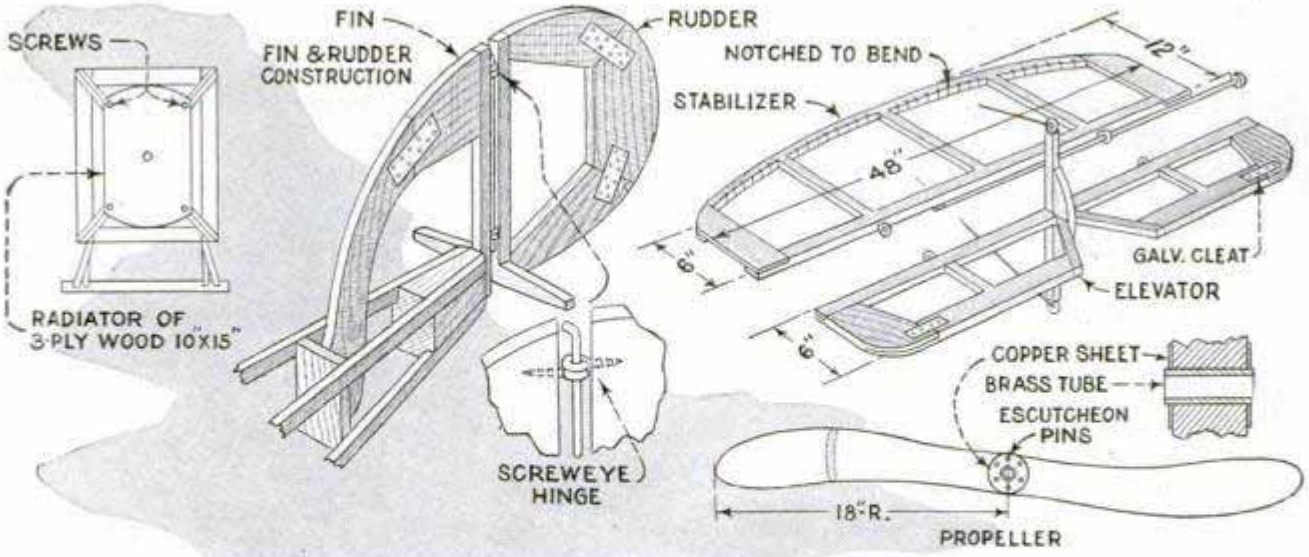


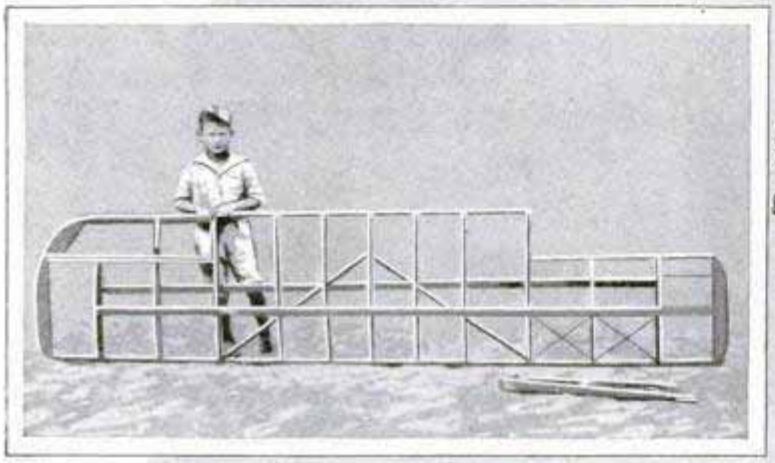
Fig. 2

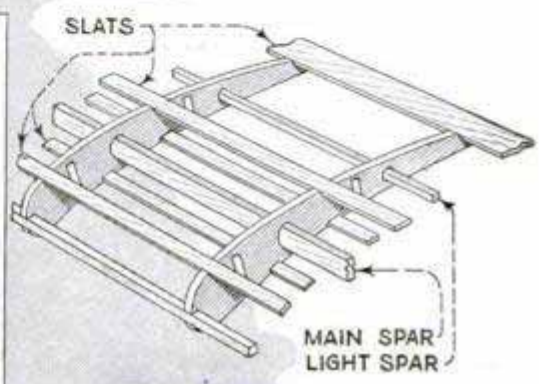
tion of how a real plane is constructed and controlled, he should have a ship big enough for him actually to ride in it. The cost of the materials for the "Midget Mail" illustrated is negligible, though no little painstaking work is required. However, balanced against the educational value, the wholesome fun and the satisfaction of making it, this little ground plane is worth many times its cost in time and money. The original plane, as shown in the accompanying photos, has been the greatest success of a long series of elaborate toys at our home. In fact, it has almost become a nuisance because so many children, from toddlers up to high-school seniors, are in convention around the house in their spare time waiting for the ship to be trundled from its hangar. There has been no abatement in weeks.

The first step is to make the transverse fuselage frames. These are all similar in design with the exception of the one (A, Fig. 2) just in front of the cockpit. This must have provision for the pilot's legs to pass through to operate the rudder bar, and also have room for the "joystick" when pushed forward in an imaginary nosedive. The corners of all frames are notched to receive the longitudinal members of the fuselage.

The latter are of 5/8-in. square section for the two bottom members and 5/8 by 1-in. stuff for the top. The bottom pieces are smaller in section, because they are

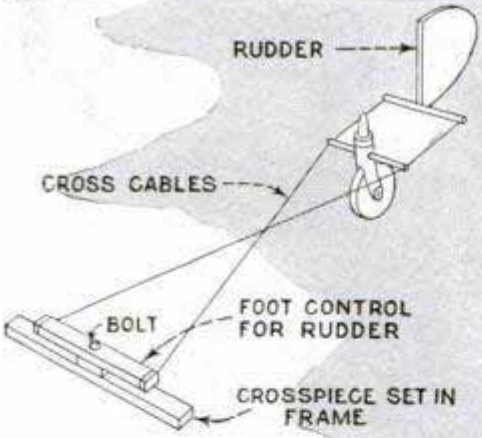


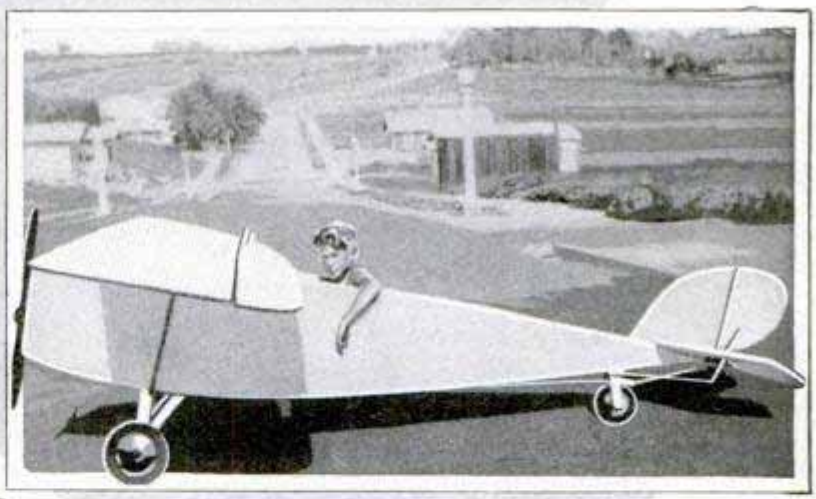


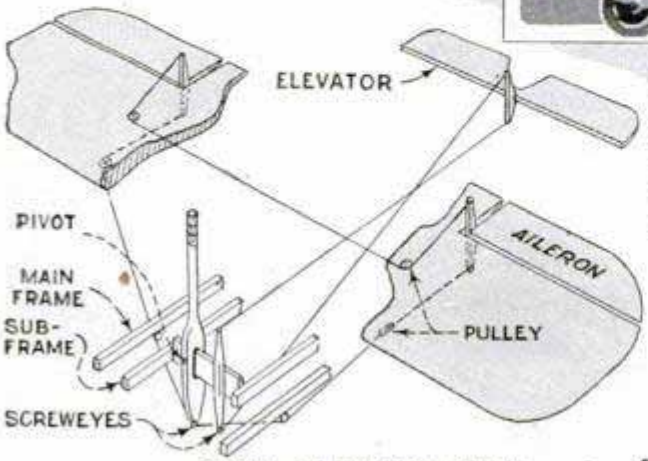


WING ASSEMBLY

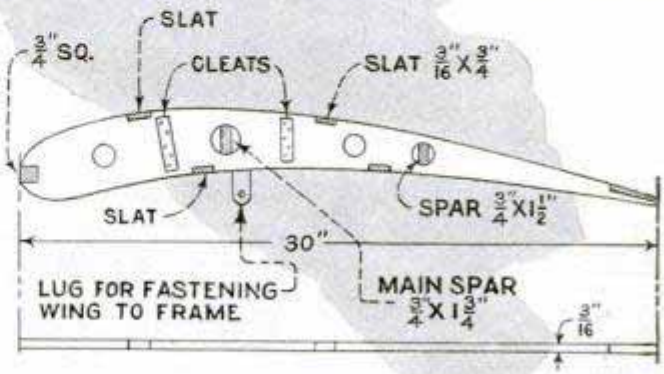
Fig. 3







DETAIL OF STEERING DEVICE



DETAIL OF RIB CONSTRUCTION

Fig. 4

required to take a greater bend. The inside corners of all four side members should be notched, about one-third through, with a saw in the front section so that they will bend in readily to meet the "radiator." They can be drawn together with stovepipe wire to meet the blocks provided for them on the inside of the radiator. Screws in the corners of the radiator board hold the latter to the frame members.

Next install the running-gear supports. These are made from 2 or 2½ by ¾-in. clear pieces, and streamlined where they are exposed below the fuselage. The vertical members come together at the top; the inclined ones are screwed to the side-frame members at top and bottom. A streamlined wood axle is secured to the supports with screws, and roller or ball-bearing coaster wheels are fitted to the ends with lagscrews.

For the rear wheel, which does the steering, one can use a strong coaster wheel with a steel fork, or a large, rubber-tired caster. Lacking either of these, a substantial wooden fork can be made, such as was used on the original model. This, however, is not as satisfactory as the metal fixtures. In case a metal fork is used, two arms should be attached to carry the steering cables. This is a simple matter on the wooden type.

Now brace the entire fuselage with stovepipe wire as shown, leaving the cockpit compartment unobstructed for easy operation. The stabilizer and vertical fin are easily made, the elevator and rudder respectively being hinged to them by means of a stiff wire running through screweyes. This permits easy dismantling for adjustment or packing.

The wing requires more skill than any other part of the ship, but if the diagram is followed and white pine used for the ribs, no trouble should be encountered. A main spar carries the bulk of the wing structure, supported by a light spar. Each of these pass through holes in the soft-pine shaped ribs. There are thirteen of the latter, including the heavier center rib, which is ¾ in.thick. All others are of ⅜-in. stuff. A stringer across the front edge of the wing, and a flat piece at the rear (Fig. 3) contribute their part in making the wing rigid.

Short pieces, marked 1, 2 and 3 in Fig. 2, are securely screwed to spar and center rib, as indicated, to serve as means of fastening the wing to the frame. Similar blocks are attached to hold the upper ends of the struts. The curved pieces of the wing tips are made of ⅜-in. white pine. To give the wing the correct taper toward the ends, trim down the rib widths in proportion to the distance from the end. The spars should also be tapered slightly, to permit smaller holes being bored in the outer ribs.

After the wing frame is completed, support it on two boxes placed near the ends, so that it will sag slightly at the center. Then brace the top side with stove wire, as shown in Fig. 2. Wherever the wire crosses a rib or slat, notch the latter not over 1/16 in., so that the wire will lie below the edge of the wood. Now turn the wing over and brace it on the bottom side in a similar manner. There should be no slack in any of the bracing wires when the wing is completed.

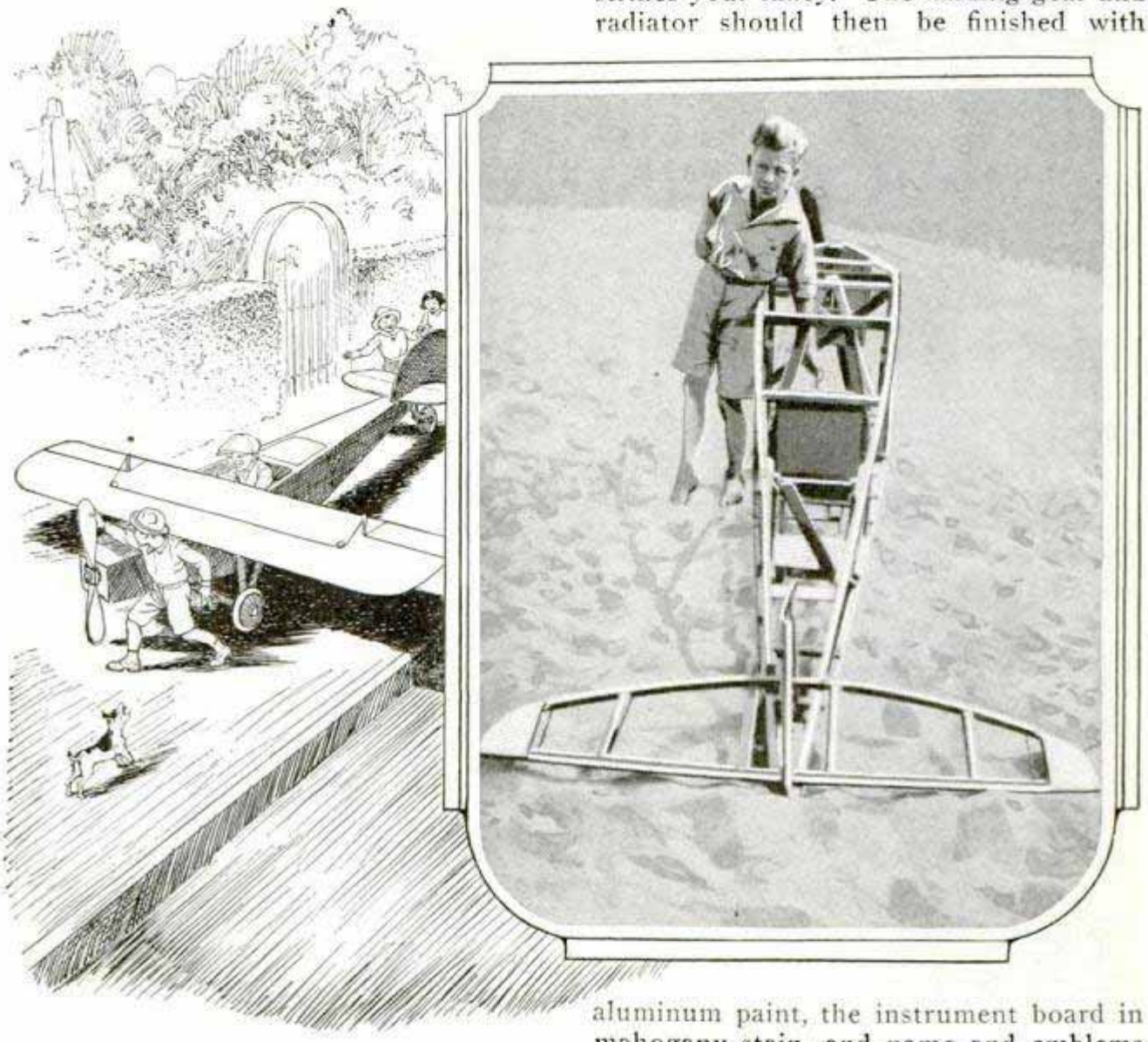
The best propeller is made from a single piece of soft wood, but the work can be simplified somewhat by making the blades separately from flat pieces of wood and inserting them in slots in a hub block and securing them with wooden pegs. The appearance of the propeller depends entirely upon the skill of the maker, and there is no very good rule to follow in making one. It is a job for a drawshave, a small plane and a gouge. A bushing made from a short length of brass tube will permit it to turn more easily on the carriage-bolt shaft, and its appearance will be greatly improved by facing the hub with a circular piece of sheet copper and studding it with escutcheon pins.

The joystick and controls are simply made, but important, for they give the boy action while he is learning imaginary take-offs, spirals, glides, dips and nosedives. The stick control, as well as the rudder, is better illustrated than described. Wire cable is preferred to single-strand wire, picture wire being very satisfactory. The cables in the rudder and elevator control can be guided through screweyes where required, but you will find small pulleys necessary on the aileron system for the reason that there are so many corners. Apply hard grease or graphite to the

cables where they rub against screweyes. A dummy instrument board, made from discarded auto accessories, will add greatly to the fascination of the craft, and should include oil, gas and temperature gauges; tachometer or revolution counter; air-speed indicator; compass; banking meter, altimeter, all made of old ammeters, and throttle and ignition switch.

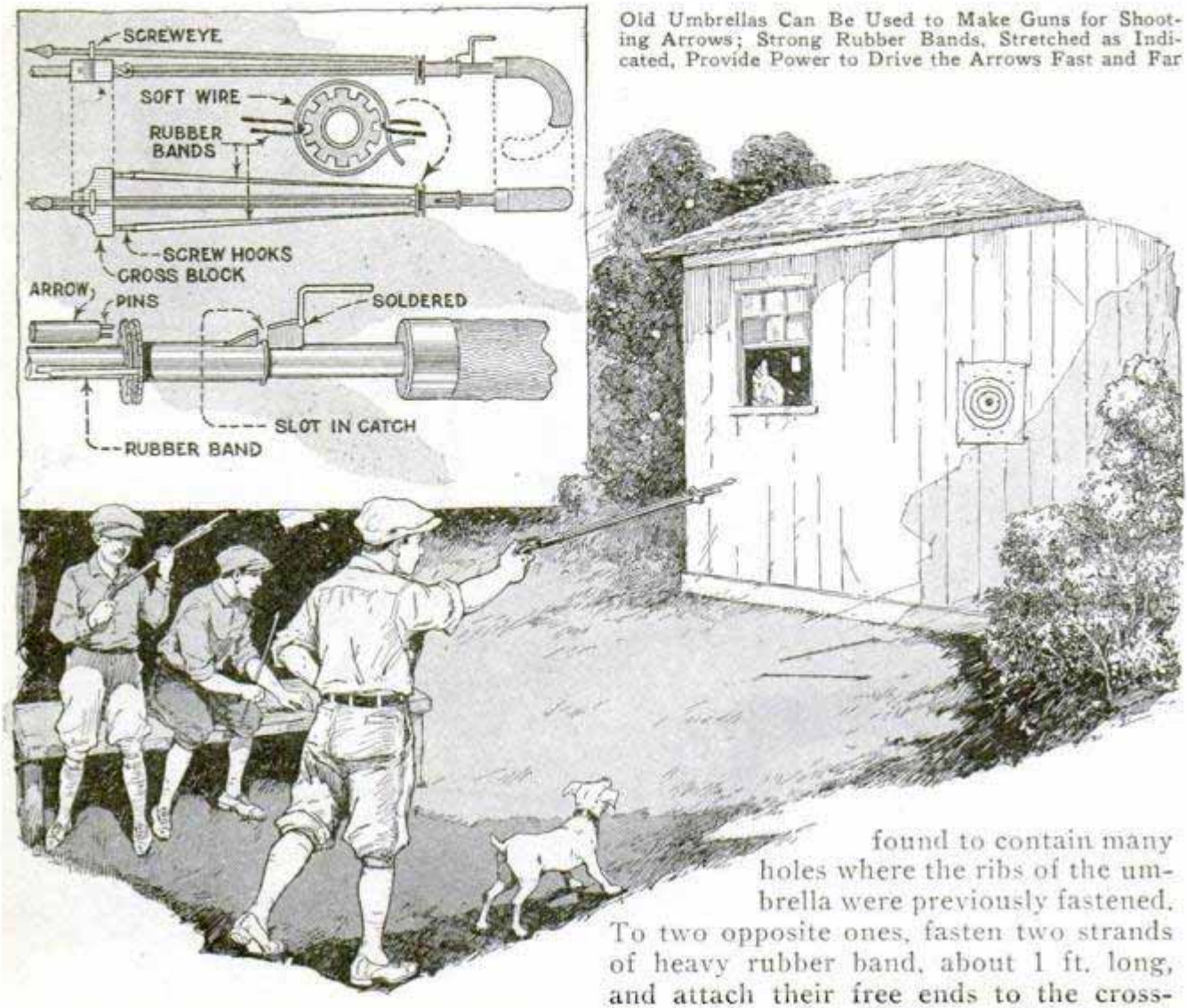
Tacking on the fabric, which is unbleached muslin, is very simple. Pull it as taut as possible over all surfaces, and use small copper tacks. The curved parts of the wing can be fitted by tacking, but where the corners of ailerons, rudder, vertical fin and stabilizer are rounded, a better job will be done by sewing two pieces of muslin together to fit the curves.

When the fabric is entirely fitted, it can be left in its original state, or your neighborhood auto painter will not charge you a great deal to spray it gray, orange, sky-blue, willow-green or any shade that strikes your fancy. The landing gear and radiator should then be finished with aluminum paint, the instrument board in mahogany stain, and name and emblems painted on the finished work.



The young owner of this ship may be assured that he will have a line of youngsters half a block long waiting their turns to coast downhill or be pushed over level pavements. Certainly it provides a tremendous thrill, and in a stiff head wind while coasting, who knows but that it might take off? It would not take a great deal of ingenuity to equip the plane with pedal drive, taken from an old "bike," so that the pilot would be independent of a "ground crew," in the very unlikely event that volunteer "pushers" were hard to get.

¶Don't wrap paper around a lamp to serve as a shade; if you go away and forget it, a fire might result from the heat. Use a glass or metal shade.



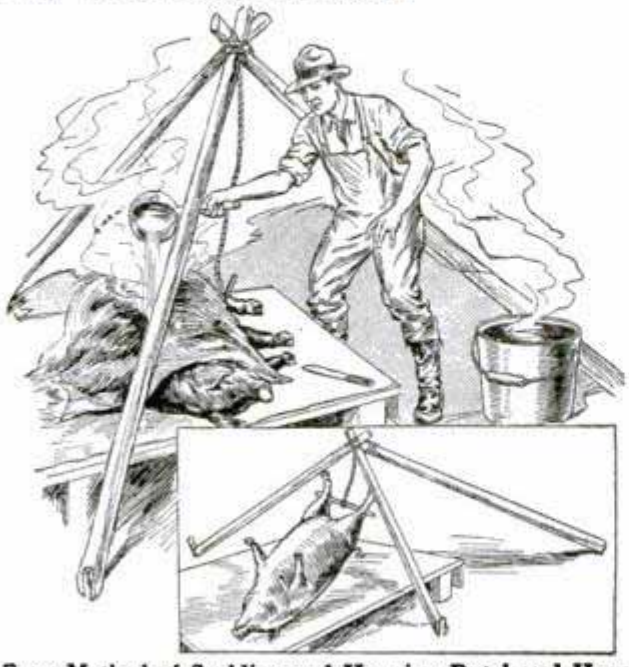
Old Umbrellas Can Be Used to Make Guns for Shooting Arrows; Strong Rubber Bands, Stretched as Indicated, Provide Power to Drive the Arrows Fast and Far

Spring Gun Made from Old Umbrella

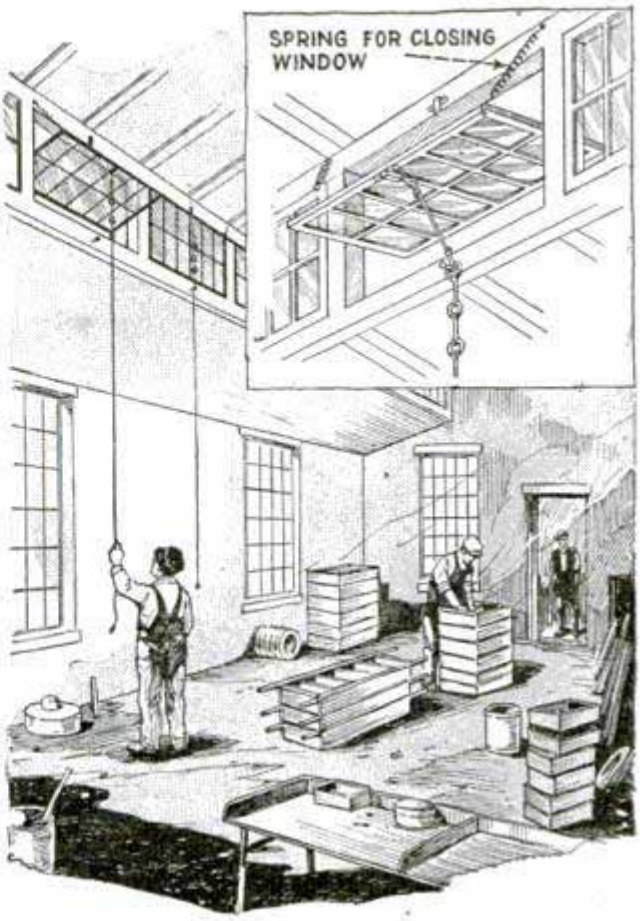
An old umbrella stick, some strong rubber bands and a few little odds and ends will make a gun that is hard to beat. With it any boy can have plenty of fun and learn to be a good marksman. Strip an umbrella so that nothing is left but the steel stick, the handle and the ferrule that slides along the stick to engage with the catches. Remove the catch near the lower end and drive on a piece of hardwood, about 3 or 4 in. long and with a hole drilled through the center. This is the crosspiece and should remain near the end of the stick. Drive a large screweye into the center of this piece and in line with the remaining catch near the handle. Solder a piece of stiff wire, which is bent in the manner indicated, to the top of the catch and file a deep notch halfway down the top edge so that the slot in the ferrule will fit over it when the catch is depressed. The ferrule flange will be found to contain many holes where the ribs of the umbrella were previously fastened. To two opposite ones, fasten two strands of heavy rubber band, about 1 ft. long, and attach their free ends to the crosspiece, as shown. Their length must be such that they have to be stretched to their limit when the ferrule is pulled back to engage with the catch. The arrows used with this gun are made from slender lengths of tough wood properly balanced. Drive one or two pins into the butt to engage with corresponding holes in the ferrule, as shown in the lower detail. If the arrows are balanced with feathers, be sure that these will go through the screweye without hindering the arrow's progress. To shoot the gun, pull the ferrule back until it engages with the slot in the catch. Fit the arrow in the screweye and set the pins in the ferrule holes. Aim as you would a gun, and press down on the trigger. This releases the ferrule which springs sharply forward under the tension of the bands and shoots the arrow where pointed. It will be clearly seen that the speed and range of the arrow depends on the length and tension of the rubber bands. —L. B. Robbins, Harwich, Mass.

Scalding and Hanging Hogs

Here is a simple method of scalding hogs, which requires little water and enables one man to handle a large carcass without difficulty. After killing the hog, lay it on sacks, or preferably a piece of canvas, large enough to permit it to be turned over. Cover the upper side thoroughly with sacks, so that there will be two thicknesses of material. Pour hot water, which is slightly below the boiling point, over the sacks, taking care that all parts of the body are covered. Remove some of the sacks and scrape off the hair, continuing until one side is completely clean. Then turn it over and scrape the other side. This method eliminates sousing and lifting. An easy way to lift a hog is as follows: Make a V-shaped frame from 2 by 4-in. stock, as shown, the legs being about 6 ft. or longer. Lay it over the hog, after the flesh is cut between the tendons and the bone of the hindlegs and a stick is inserted. Brace the legs of the frame and tie a rope to the gambrel stick, fastening the rope securely around the top of the frame. Now get a piece of 2 by 4-in. stock, about 9 ft. long, and also fasten it to the frame by means of a small rope. Drive a couple of spikes into this piece and also into the frame to prevent the rope from slipping. When all is secure, push the 9-ft. brace until the carcass is clear of the ground. This is a job that a single man can perform easily.—Edward Van Valkenburg, Silvis, Ill.



Easy Method of Scalding and Hanging Butchered Hogs Single-Handed



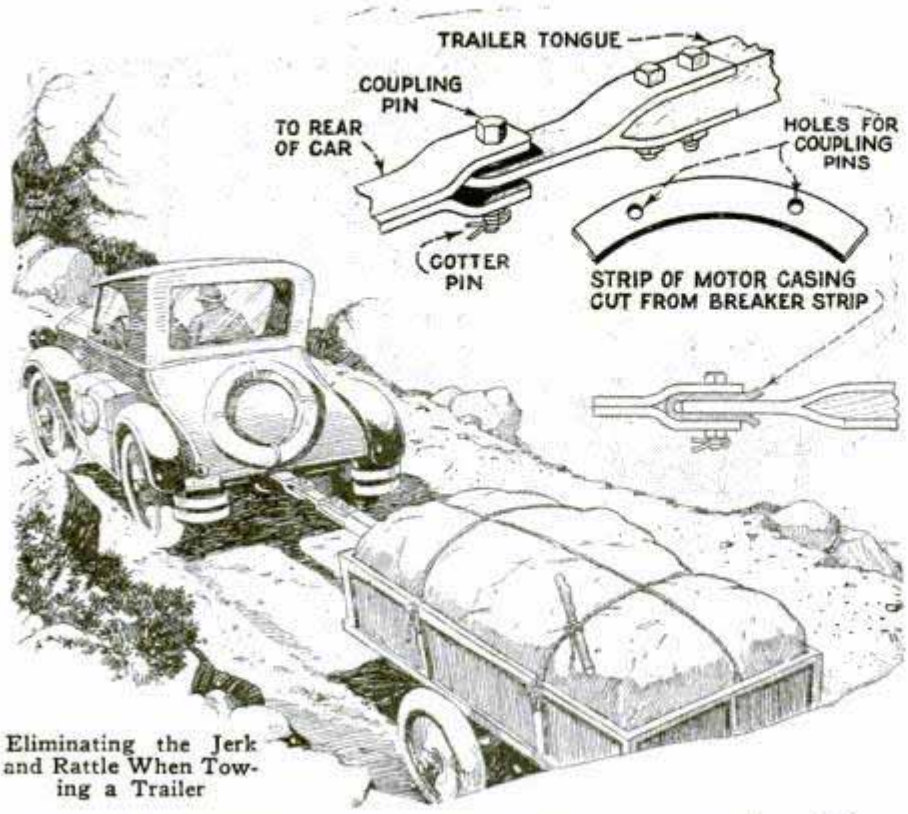
Simple Method of Opening and Holding Overhead Windows in Any Desired Position

Opening Swinging Windows That Are above Reach

In a trip through a brass foundry the other day, I noticed a simple method of opening overhead windows and holding them in any position desired. A light but strong cord was fastened to the window catch so that a pull would unlatch the window and swing it open. A spring was fastened to the upper window frame and the sash, as shown, so that the window had to be pulled against its resistance. Several metal rings were tied to the cord and looped over a nail, as shown, to hold the window open in any position. The windows were about 25 ft. overhead.—K. M. Coggeshall, Webster Groves, Mo.

Staining Wicker Furniture

Many purchase unfinished wicker furniture with the idea of staining it when it is soiled beyond the cleaning stage. In most cases oil stain is used for this purpose, but, after a few months, the stain wears off. Water stain is preferable, as its power of penetration is much greater.—L. H. Georger, Buffalo, N. Y.



Eliminating the Jerk and Rattle When Towing a Trailer

Shock Absorber for the Auto Trailer

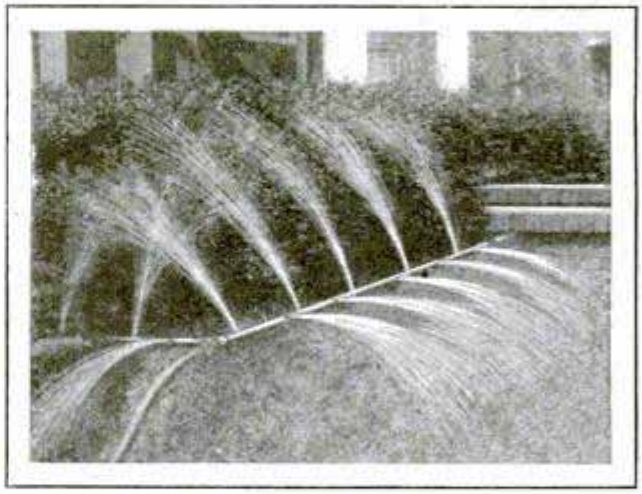
The writer frequently has occasion to pull a trailer behind an auto, and has attempted for a long time to make some sort of a shock absorber to eliminate the rattle and jerk between the trailer tongue and the connecting yoke at the rear of the car. It is this constant rattle and jerk which make towing a trailer more or less unpleasant. After trying various methods, none of which were successful, I tried padding the end of the trailer tongue with a piece of old auto casing. It works as well as could be desired, eliminating so much of the rattle and jerk that I do not mind towing a trailer. The shock absorber is cut to the desired dimensions; two holes are punched through it to take the coupling pin, and it is then attached as indicated. A piece of casing will last about 1,000 miles, and then it is a simple matter to cut another.—John Edwin Hoag, Los Angeles, Calif.

Removing Emulsion from Old Negatives

There are several methods of cleaning emulsion from old negatives. The most common is to use hot water. This is equally effective on film and glass, but when used on film, the water should be just hot enough to melt the emulsion. Clean both sides of a film, as the back is covered with emulsion to prevent curling. Caustic soda can be used for cleaning glass plates, but not for films, for the reason that reaction between the two may cause the film to take fire when it dries. The proper caustic-soda solution for cleaning should read about 10 by a hydrometer test. Do not get your hands into the caustic solution while doing the cleaning. Use rubber gloves and protect the clothing in some suitable way. If possible, place the negatives on a rack to keep the surfaces separated. When the emulsion is softened and commences to peel away, transfer the plates to a tub of clean, hot water and scrub them with a brush.—L. B. Robbins, Harwich, Mass.

System for Watering Hedges and Terraces

The photo shows an inexpensive watering system for hedges and terraces. Lengths of pipe are laid on the ground under the hedge, as indicated. The pipes are arranged to receive the end of a hose when watering is required. Numerous holes drilled in the pipe permit gentle application of water.



Permanent Pipe Installation under Hedge Waters Both Hedge and Terrace

151 Carhart St Marys Ohio.

Can You Do It?

by Sam Brown

"CAN you do it?" Everywhere we are met with this question, and so the performer turns Can-You-Do-It man, and proceeds to entertain the evening party with a few easy "give-away" problems, and incidentally, maybe, to turn the tables on the literary light of the party, who has stumped him with a simple question like "What year was Tutankhamen born?"

The first problem out of the bag is the "Long Reach." In this number, the entertainer seats a member of the audience in a chair, and places a cork, or some similar object, to the right and a little in advance of the subject's left foot. The problem is to reach down between the legs with the right hand, going around behind the left leg as shown in Fig. 1, and remove the cork. The subject, of course, is warned that he or she must not slip forward on the seat of the chair, but must sit as first placed. Can you do it?

You will, no doubt, affirm that you can if you are an average person, and have looked at all the pictures before reading the article. Even though you must not slip forward on the seat, the chair need only be tipped forward, as shown in Fig. 2, and the feat becomes quite easy.

If someone handed you an ordinary soda straw, and asked you to lift a heavy bottle, using the straw only, you would probably look him over carefully and then advise him to see a doctor. However, it can be done! Bend the straw, as shown in Fig. 3, in such a way that, when inserted in the bottle, the short leg of the doubled straw will catch under the shoulder of the bottle, and enough of the longer leg will project from the neck to enable you to grasp it, and the trick is done. Of course, the bottle selected for the trick must be of such a size and shape that the long leg will project from the neck; otherwise the performer may be embarrassed by not being able to do his own trick.

Can you touch one card in a deck, and only one, and make the entire 52 cards turn over? Well, why not? Lay the cards out as shown in Fig. 4, one overlapping the other in a long line. Now slip your finger under the card at the end of the line (the first card laid down) and start lifting it by its outer edge. Don't grasp the card, lift it up with one finger. This, of course, will make the cards that overlap it rise also. Keep on lifting until the card is vertical, and then exert a steady pressure to the right (Fig. 5), and the remaining cards will obligingly somersault for your benefit, and will finally assume the position shown in Fig. 6, completely turned over. A little experimenting will show how the cards should be overlapped, and will demonstrate how the end card should be continually shoved in the

Above, How the Cork Is Lifted; Left, Raising the Bottle with the Soda Straw

direction of the remainder of the pack, lest it turn completely over before an impulse has been given to those at the right.

Place a cork in a glass of water. It floats! Sure it does, but what of it? Well, can you place a cork in a glass of water in such a position that no one can remove it without spilling every drop of water? Of course you can! Simply place a sheet of heavy paper over the mouth of the glass, invert the glass on the table, and then pull the paper away. Where's the cork? Try and get it. Just a word of warning: Inspect the glass before you use it, for a little chip on the edge may ruin your budding reputation as the "life of the party"!

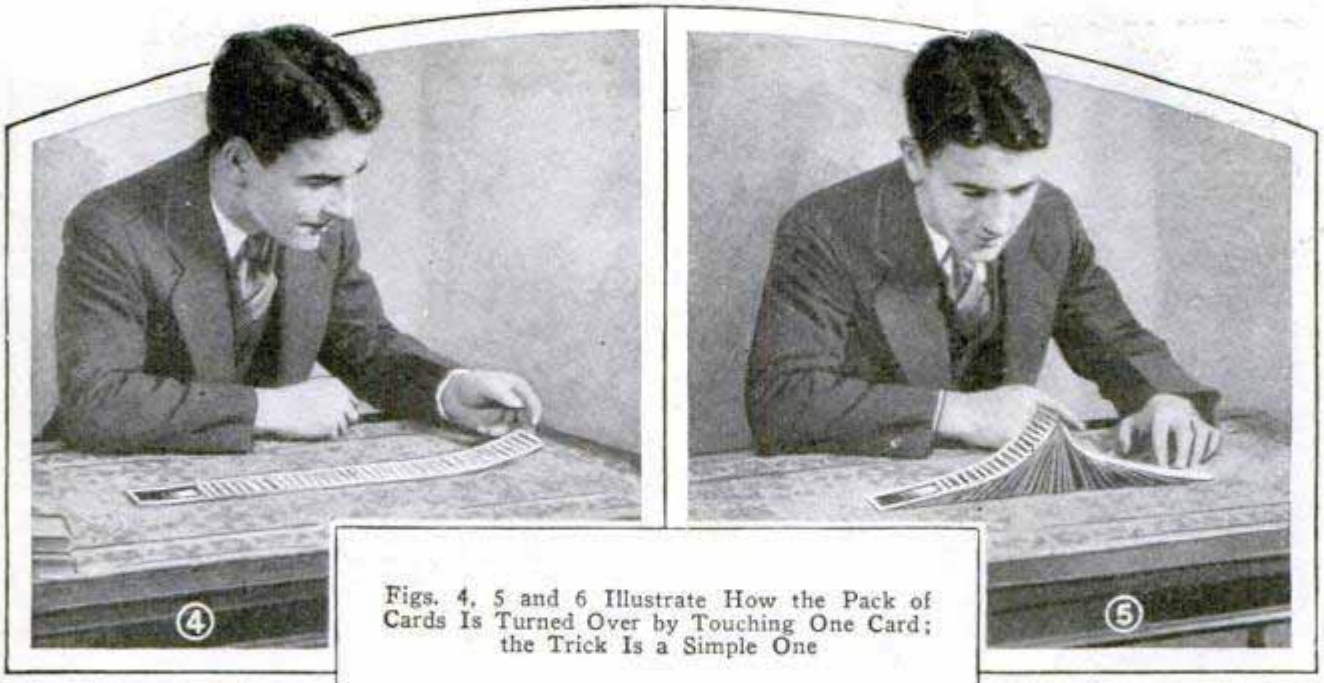
Imagine that you had only half of a match box—the cover—and you wanted a whole one. Could you make it? Allow me: Simply cut the cover into three portions, A, B and C, as shown in Fig. 8, assemble A and B as in Fig. 9, then slip C diagonally into the opening between A and B, and there you are! The finished box appears in Fig. 10. It is an odd-shaped match box, but it's a whole box, none the less.

Here is how you test the lungs of the audience, who are, by this time, breathless with amazement—perhaps. Take a visiting card and turn the ends down for a distance of about ¼ in., forming a sort of "U." Place this "U," inverted, on the table. Now, the problem is to turn the card over by blowing. Can you do it?

It's not likely you can, even if you are gifted with a pair of lungs like the wolf in the fable, who "puffed and puffed until he blew the wee house down," unless you know the secret. Don't blow at the card as is the natural thing to do, or even under it, but blow on the table, about 10 in. from one of the open ends, as illustrated in Fig. 11, and the card will turn.

Here's a new game with dice, to be played by two persons. Each is provided with a die. You show one side of your die, say the one-spot. The second player also shows a number, Fig. 12, and this number is added to yours. The addition is continued and the first player reaching 50 with a show of his or her die wins the game. Simple enough, but can you always win? Certainly, here's how: There are certain key numbers, 8, 15, 22, 28, 36, 42 and 50. You should commit these to memory, but that is an easy task. Now you must exhibit your die so that its spots, when added to the previous total, will equal one of the key numbers. To play safe, start with the one-spot, as mentioned above, and then, whatever your opponent shows, you need only add sufficient to it to total eight, and so on.

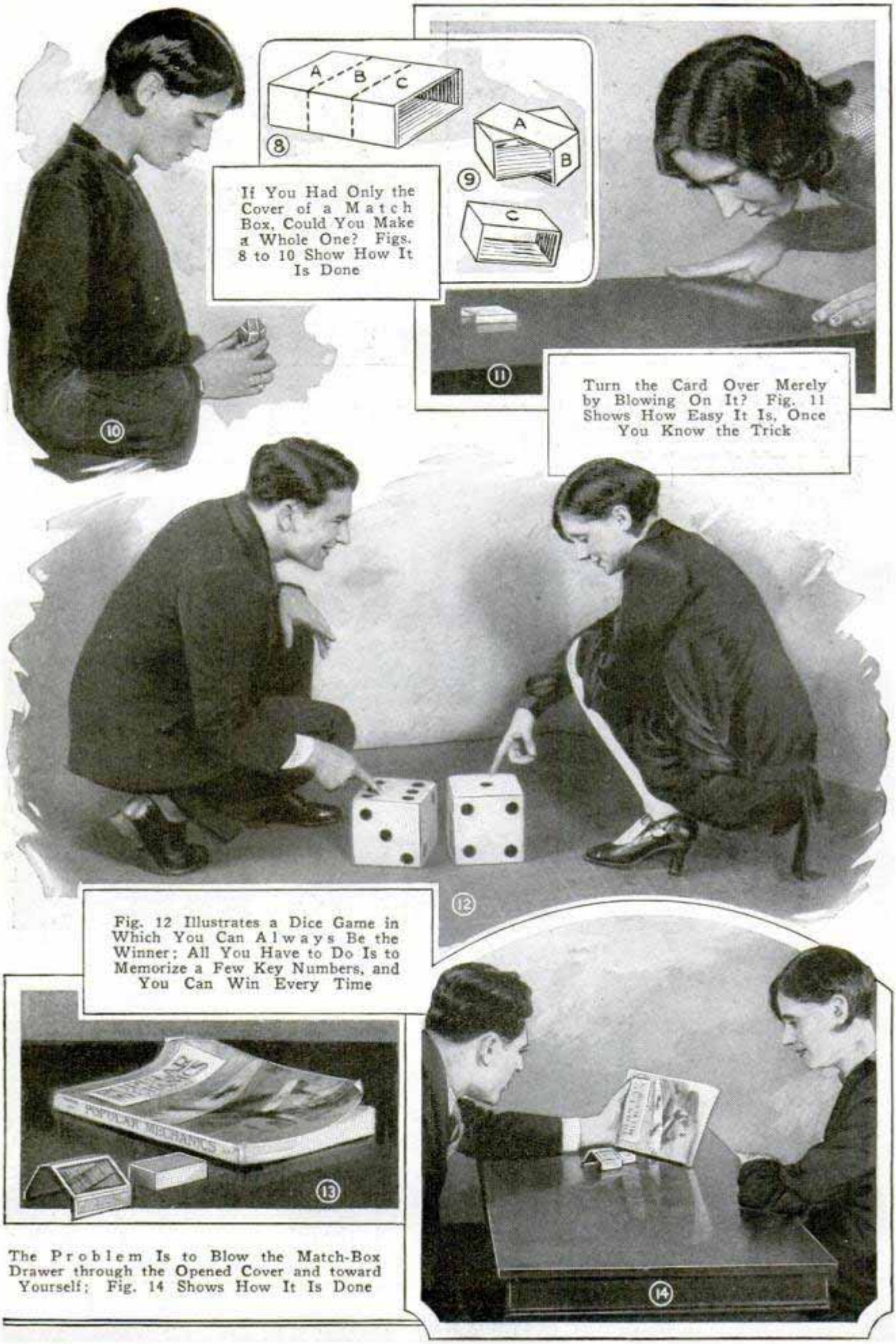
For example, if A (yourself) shows a one-spot, and B shows a six, the total is seven, and A must next show a one to bring



Figs. 4, 5 and 6 Illustrate How the Pack of Cards Is Turned Over by Touching One Card; the Trick Is a Simple One

Fig. 7 Shows How the Cork Is Put in the Glass of Water So That It Cannot Be Removed without Spilling the Contents

the total to eight. B may now throw or show a three, which will bring the total to eleven, and A must then exhibit a four to bring it to fifteen, which is the second key number. If B next shows a three, the total will become eighteen, and A must show another four to bring it to 22, the third key number. Continuing in this way, A will always have the deciding show, and will always win the game. If it happens that B at any time shows a num-



If You Had Only the Cover of a Match Box, Could You Make a Whole One? Figs. 8 to 10 Show How It Is Done

Turn the Card Over Merely by Blowing On It? Fig. 11 Shows How Easy It Is, Once You Know the Trick

Fig. 12 Illustrates a Dice Game in Which You Can Always Be the Winner; All You Have to Do Is to Memorize a Few Key Numbers, and You Can Win Every Time

The Problem Is to Blow the Match-Box Drawer through the Opened Cover and toward Yourself; Fig. 14 Shows How It Is Done

Can You Lift a Number of Matches without Using Your Hands, with the Aid of Only the Cover of the Match Box? If You Can Produce a Good Vacuum, the Rest Is Simple

Here Is a Very Easy One; All You Have to Do Is to Take a Pack of Cards, Lay Them, Face Down, on the Back of Your Hand, as in Fig. 16, Above. Then Flip Them Gracefully in the Air and Catch Them Delicately in Your Fingers, as in Fig. 17. Try and Do It!

ber that makes the total fall on a key number, A simply shows a one-spot, and starts the process all over again.

Here is another lung tester. Arrange a match-box drawer and its cover, cut open, in the manner shown in Fig. 13. Now, standing on the side nearest to the cover, can you blow the drawer toward yourself and through the bridge formed by the cover? No, not suck it through; blow it through. It's really very simple. Take a magazine or book, and hold it in the position shown in Fig. 14. By blowing against this you can waft the drawer through the cover, and thus accomplish the seemingly impossible.

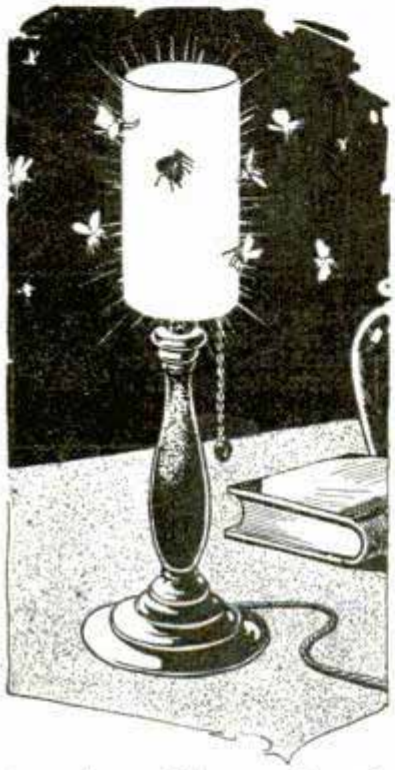
The entertainer now arranges a number of matches on the table, side by side, so that they form a compact square. The problem is to raise the matches from the table, using the cover of the match box only, and this cannot be held in the hands. Can you do it? The solution, as usual, is easy, and is illustrated in Fig. 15. The match-box cover is held in the mouth. By placing the other end over the matches and sucking in the breath sharply, the resultant vacuum will cause the matches to adhere to the open end of the box, and they can be lifted several inches.

Now for one that really justifies the title of this article. The performer ex-

hibits an ordinary pack of cards. He places half of these on the back of his hand, as shown in Fig. 16, and then, raising his hand smartly, he somersaults the cards from the table and delicately catches them in his fingers, as illustrated in Fig. 17.

But can you do it?

Trap for Catching Moths at Night

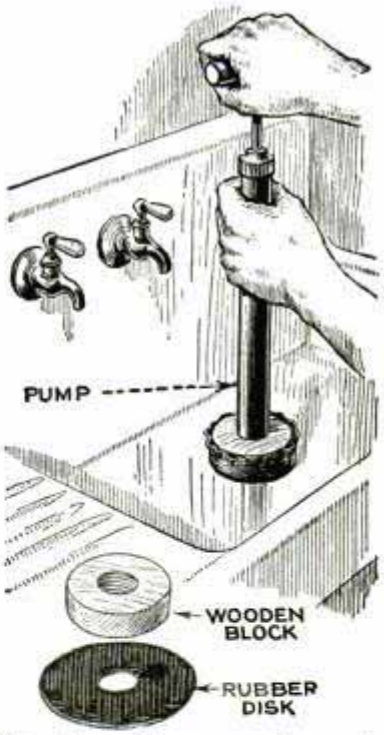


At summer cottages where moths and other insects get into the house every time the screen door is opened, especially at night, the trap illustrated will be found effective. Roll a piece of flypaper to form a cylinder with the sticky coating on the outside, and pin the overlapping edges together. From a length of wire form a ring that fits on the top of an ordinary electric lamp, leaving the ends of the wire extending on opposite sides of the ring and pushing them through the wall of the cylinder from the inside, near one end. The cylinder is then hung over a lamp, as shown. The bulb should, of course, stand upright and there must be plenty of space between it and the cylinder to prevent the heat from causing the coating on the paper to run. The light attracts the insects and they are caught on the flypaper. —William C. Thomas, Chicago.

Use of Pack Films in Cut-Film Magazine

Like a great many other photographers, who now do the bulk of their work on cut films, instead of glass plates, I use a cut-film magazine. I usually carry a few film packs. Once on a photographic trip remote from any supply store, I had used up all of my cut films and then found that a leak had developed in the light trap of the only film-pack adapter I had with me. However, I had a changing box, and attempted to load pack films into the cut-film magazine by tearing the pack to pieces inside of the changing box, and putting the films into the partitions of the cut-film magazine. With this arrangement, I found that the pack films could be inserted without any trouble, provided care was taken when pulling off the paper tabs, and that they seemed fairly secure. In taking pictures with this outfit, the different exposures could be turned up in the cut-film magazines without any tendency of the pack films to drop out of the partitions. The development of the exposures produced a set of negatives that were entirely satisfactory. This kink enabled me to take twenty-four additional photos. The same method can be used with ordinary two-shot cut-film holders.—J. E. Hoag, Los Angeles, Calif.

Cleaning a Stopped Sink



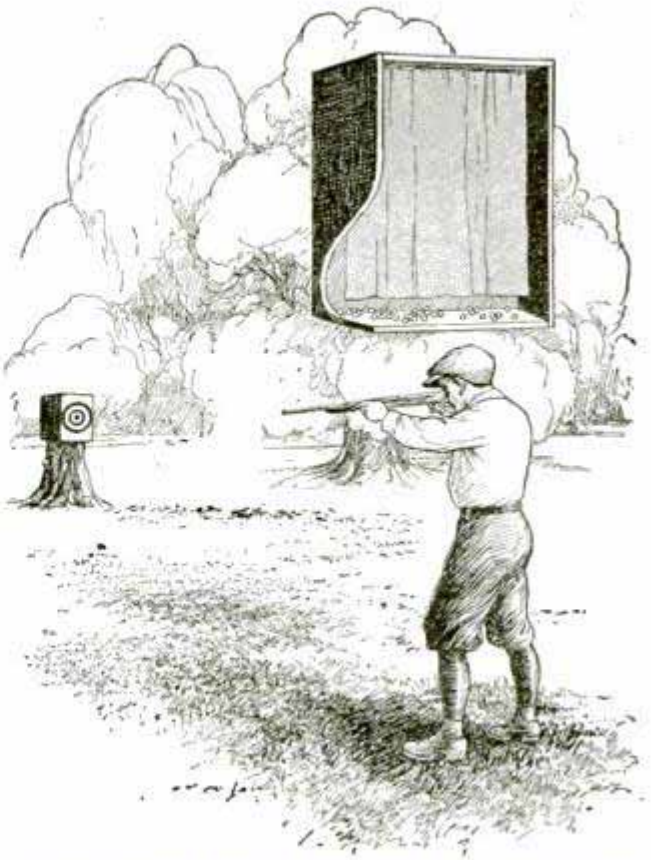
The other day a stoppage in the kitchen sink required the improvising of a device to clear it, as there was no tool at hand for the purpose. An old tire pump, a piece of sheet rubber and a wooden plug turned the trick. The plug was about 1½ in. thick and 3 in. in diameter. This was bored, through half its thickness, with a bit slightly smaller than the pump barrel, and the rest of the way with a 1-in. bit. A disk, as shown, was cut from the sheet rubber and stretched over the bottom of the plug, then drawn tight with tacks. The pump barrel was unscrewed from its foot stirrup and screwed into the plug. The whole device was then set over the drain opening and the handle of the pump

forced down. If the stoppage is far from the sink opening, water pressure must be used to force it away, instead of air. Have a pail of water handy, or fill the sink with water. Then fill the pump barrel and force the handle down as before, after the pump has been placed over the drain. Several charges may be necessary before the obstruction is removed.

Lock for the Cellar Trapdoor

Inclined cellar doors of the kind shown in the drawing are seldom locked. A padlock may be used for this purpose but it is rather unhandy. A simple and effective latch can, however, be provided, which is opened by merely pulling a cord and closes automatically when the door is shut. It consists of a strip of rubber band cut from an old inner tube, a hook and staple and a length of cord. The hook is pivoted to the door jamb and the staple is driven into the underside of the door in line with the hook, so that the latter, when swung back and forth engages and disengages with it. The rubber band is then tacked to the door jamb and is connected to the hook by means of a cord. The band should be slightly stretched when the hook engages with the staple. Another cord is tied to the hook but is run in the opposite direction, to any convenient point. Pulling this cord releases the hook from the staple, while, when the door is closed and the cord loosened, the rubber band pulls the hook back into engagement.—Mrs. Orville J. Kaiser, Warrensburg, Mo.

Simple Locking Arrangement Which Is Handy to Use for Inclined Cellar Doors



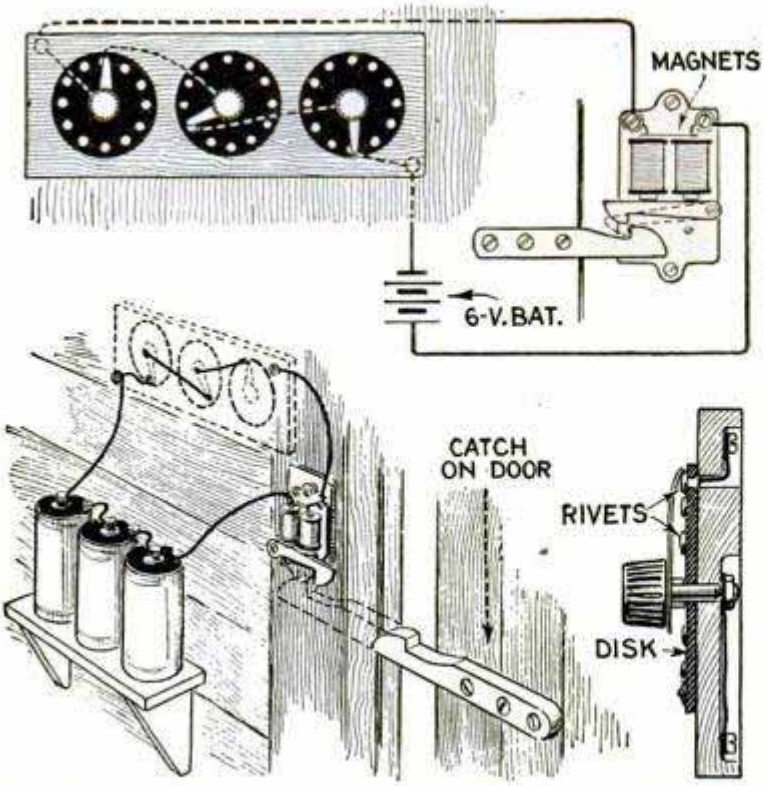
Air-Rifle Bullets Can Be Saved and Used Over Again with This Target

Target Saves Air-Rifle Bullets

A target for air rifles which will save the bullets without deforming them, so that they can be used repeatedly, may be made from a fairly large wooden box and some heavy cloth. The cloth is hung inside of the box, without touching the back, and is nailed only at the top. After the bullets have passed through a paper target tacked to the front of the box, they will strike the cloth and, their force being practically spent, drop to the bottom, where they can be collected.—E. T. Gunderson, Jr., Humboldt, Iowa.

How to Make Flypaper

Linseed oil, rosin and honey, which are readily available, can be used to make a good sticky flypaper. Melt a lump of rosin in linseed oil until the mixture assumes the consistency of a thick paste. Do this over a slow fire, so that the rosin will not burn. Then add about one-third the volume of clear honey and stir thoroughly. Apply the mixture while it is hot to sheets of heavy wrapping paper with a stiff brush, and when the sheets have cooled they will have a sweet, sticky surface.—L. B. Robbins, Harwich, Mass.



Combination Electric Lock for Sliding Door Which May Be Operated at a Distance

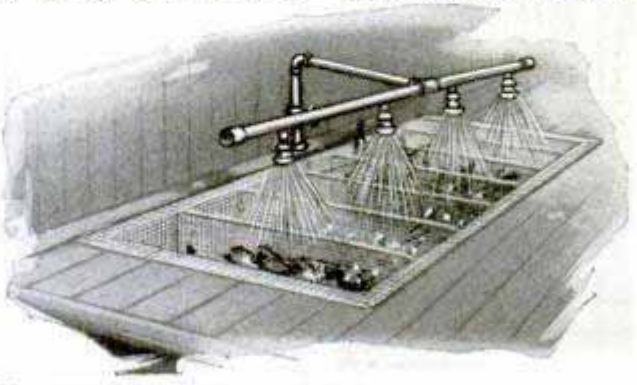
Remote-Control Electric Combination Lock for Sliding Door

A novel electric lock for a sliding door is shown in the drawing. The current to operate it is obtained from a battery of three dry cells, a 6-volt storage battery or a bell-ringing transformer connected to the house-lighting circuit. The lock consists of a magnet taken from a doorbell or buzzer, a wooden latch securely screwed to the sliding door, a soft-iron catch to engage with this latch, and three radio inductance switches or sets of switch points and levers.

The latch is made of some hardwood, oak or ash, for instance, and is screwed to the door at any convenient height so that it projects over the door jamb or the wall about 3 in. It may be made of brass, if preferred, but not of iron or steel. The soft-iron catch is pivoted to the wall so that, when pulled up, it will just clear the latch, and when at rest, it engages with the latch, keeping the door locked. Strip a large electric doorbell of everything except the magnets, leaving them attached to the base, which is then attached to the wall at such a distance above the catch that, when an electric current is sent through them, they will raise the catch. If radio inductance switches are not available, get three bakelite or hard-rubber disks, about 3 in. in diameter, drill 12 holes in each disk for switch contacts and one in the center for a switch lever, or the disks may be cut from small phonograph records. Set the disks in line on a panel in the place from which the lock is to be operated. Connect the points and levers as indicated. Choose switch points in different positions on each disk to make the combination that works the lock difficult to discover by persons "not in the know." To make it possible to operate the lock, the latch should drop into place loosely when the door is tightly shut. To open the door, turn the switch levers on the disks until each makes contact with the wired point. The setting of the last lever completes the electric circuit through the magnets, and the catch is raised so that the door can be slid aside. Then turn the switch arms to break the circuit. The combination can, of course, be altered at will by changing the wiring to the switch points.—L. B. Robbins, Harwich, Mass.

Sprayer and Drain for Vegetables

Vegetables on display in a large Colorado store, are kept fresh by a fine spray of water which is kept up all the time. The display also attracts attention as a novelty. A sink in the window is fitted with a wire-mesh tray having a number of compartments and a pipe with suitable sprays above it, as shown in the photo. —Charles A. Goddard, Los Angeles, California.



Vegetables in a Display Window Are Exposed to a Constant Spray of Water

Making a Chinese Screen

By HERBERT C. McKAY

RECENTLY miniature Chinese screens have become very popular, but their high price puts them out of the reach of most of us. By the method described here, these screens may be closely imitated, and the designs altered in cases where the Chinese touch is not wanted.

The original screens are made of two thin slabs of colored stone, the first layer being pierced to show the contrasting surface of the underlying stone and the two mounted between two uprights of black wood.

In making our screens, we substitute two sheets of different-colored celluloid for the stone slabs, and use the same material for the supports. The separate pieces are then assembled with celluloid cement, which makes the operation quite simple.

The materials needed are: 2 sheets of black celluloid, 5 by 7 by ⅛ in. and 3 by 11 by ¼ in., respectively; 1 sheet of white celluloid, 5 by 7 by ⅛ in., and 1 tube celluloid cement.

The 5 by 7-in. sheets are carefully squared and the edges smoothed. A coarse-toothed saw blade will work this material more satisfactorily than a finer one, as the heat generated by the fine saw tends to melt the fragments removed from

the sheet into a paste which cements the material behind the blade. The black sheet is then sandpapered thoroughly on one side until all the gloss is removed. The design to be used is drawn on this side with a colored pencil sharpened to a fine point. Thin-lead red pencils are very useful for this work.

When the design is completed, it is sawed out in the usual manner, using either a hand or power fretsaw. As the celluloid will crack near the end of a cut, this sawing must be carefully done, and when completed, there will be several rough places in the fretwork. These

are removed with a coarse-cut file of knife-blade shape. Round and half-round coarse files will also be useful. After the preliminary smoothing, all sawed edges are carefully finished with sandpaper. The white sheet is now sanded until the surface is matted. The back of the black design is coated with celluloid cement, then laid upon the white sheet, and both placed under pressure for about two hours, when they should be firmly united.

In the meantime, the sidepieces are cut out. These may be of any desired design. The design shown in the photos, or one similar to it, may be economically cut out of the 3-in. strip of celluloid by laying out the sidepieces "head to tail," that is, with the foot or base of one piece at one end of the strip, close to the side, and the foot of the second at the other end. In this manner, the width of the bases may be made a little over 2 in. The width of the upright portions should be ⅜ in., or a little over, so as to allow about 1/16 in. of overlap on the panel, when assembled. The over-all length, laid out in this manner, will be about 10 in. If any other design, demanding a wider base, is selected, it will be necessary, of course, to obtain a correspondingly wider piece of material. When they are cut out, the edges are smoothed with a file, and one side is sandpapered until mat. One sidepiece is laid on a table, dull side up. One edge of the combined sheet is given a thorough application of cement and gently placed upon the sidepiece. It is held so for a few moments; then, turning it upside down, the assembly is put in a vise in such a manner that the stand or sidepiece lies on top of the screen. Now prepare the other sidepiece and fasten it in the same way. When this has been done, and the cement partly set, bind the whole with string and put it away for twenty-four hours to set completely.

If no cement is at hand, it may be made by mixing one part acetone and two of amyl acetate and adding to the mixture a few shreds of transparent celluloid. A camera film, 1 by 2 in., finely shredded, suffices to ripen 2 oz. of the mixture.

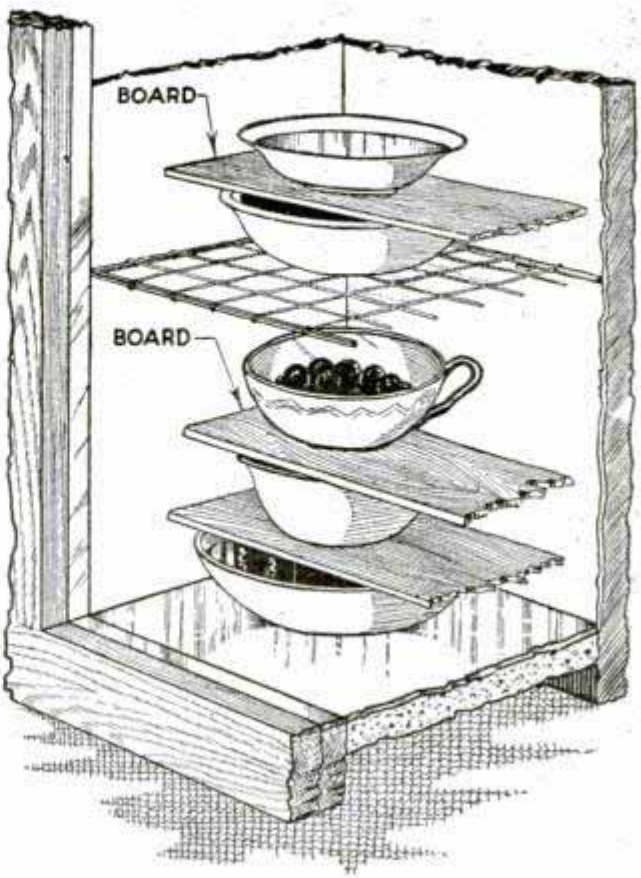
Protection against Vermin

In mountainous sections, pack rats, weasels and other kinds of vermin are quite common. They force their way into boxes of food, bedding, and, in fact, everything. To exterminate them is impossible, and the best thing to do is to arrange things so that they cannot do any harm. One method, which I have found highly successful, is to place each leg of a table in an empty coffee can. The creatures, even if they gain access to the cabin, cannot climb over these cans. Thus, whatever is put on top of the table is perfectly safe from them. Another practical scheme is to line the inside or outside of clothing chests with sheet metal, preferably tin, to prevent the animals from gnawing their way through. As many things as possible should be kept in cans or tin-lined containers.—Henry H. Graham, Twin Falls, Idaho.

Homemade Tumbler Holder

Tumblers set on window sills, tables or other painted or varnished surfaces are likely to leave water marks and are also in danger of being knocked down and broken. A wall tumbler holder, which will prevent these risks is shown herewith. It is made from a length of No. 10 or 12 galvanized-iron wire, bent into a circle, about ½ in. larger than the bottom of the tumbler, then brought down about 2 in. and formed into a smaller circle directly under the first. The diameter of the second circle should be less than that of the tumbler bottom. Finally, bend the wire out horizontally, then up at right angles, and form an eye at the end for a woodscrew by which it is fastened.—W. C. Thomas, Chicago.

¶A hot-water bottle held against a porous plaster will assist in quickly removing it from the skin.



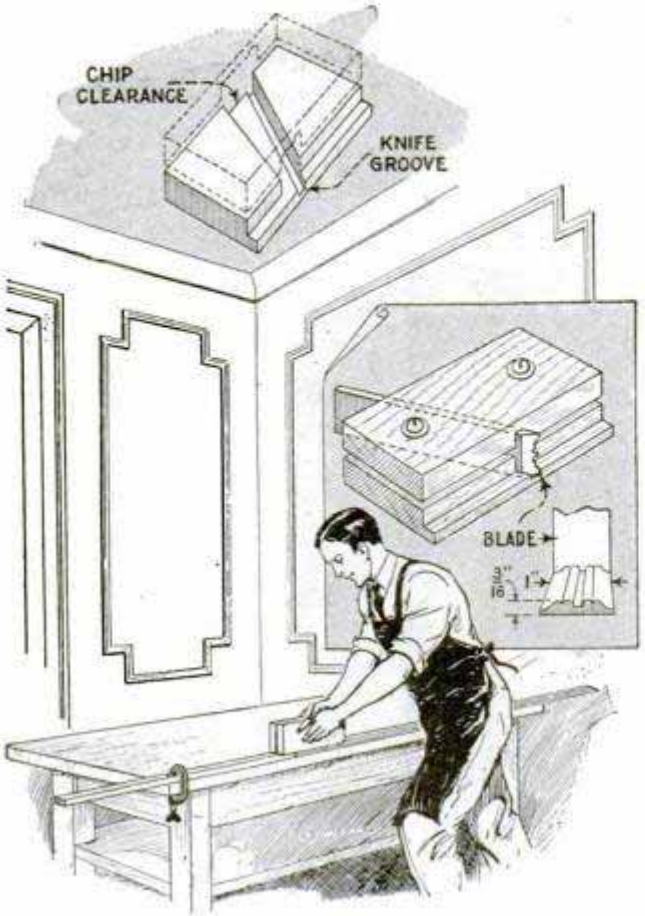
Economizing Space in a Refrigerator by Piling the Dishes on Each Other

More Space in the Refrigerator

If your refrigerator is small and gets overcrowded, obtain some thin lumber from an orange crate and cut pieces large enough to reach across the dishes placed in the refrigerator. Deep dishes should be used whenever possible. With the boards arranged as shown, several dishes can be piled on each other. The boards should be scalded occasionally to keep them sanitary. Pieces of slate from roof covering also may be used for the purpose. If economy is no object, get a dozen wire shelves similar to, but smaller than, those already installed in the refrigerator. Meats and some vegetables can be piled on the shelves without the dishes.—James F. Hobart, Dunedin, Fla.

Restiffening Straw and Panama Hats

Straw or panama hats that become flimsy and soft from usage, or from becoming damp, may be restiffened very easily. Dissolve ½ oz. of gum arabic in ½ pt. of water and use this to sponge the inside of the crown and the underside of the brim. Allow the hat to dry in the sun, and it will have the required stiffness.



Improvised Beading Plane for the Home Owner's Tool Kit Is Used to Make Molding

Improvised Plane for Making Molding

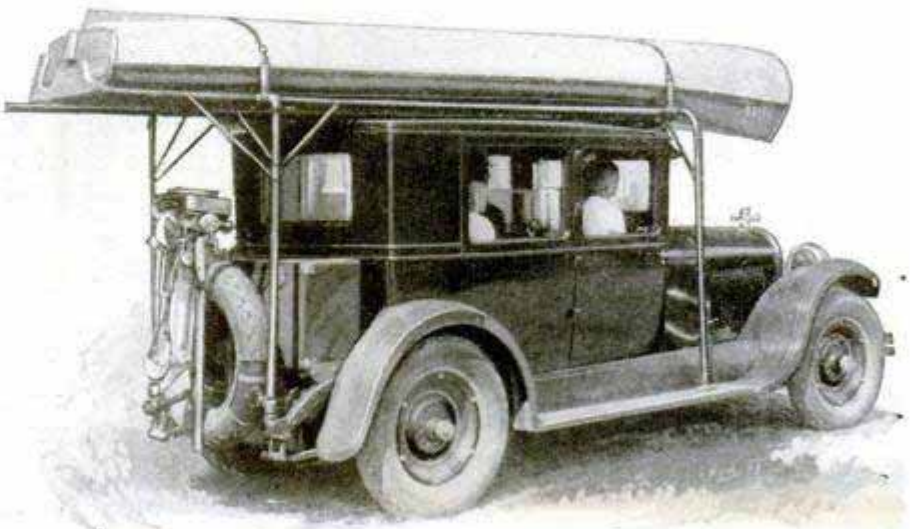
Paneled walls add to the appearance of a room and this method of decoration is well within reach of any home owner if he is handy with tools. The molding used for this purpose has a number of small grooves and ridges, and is not always obtainable at lumber yards. It can easily be made, however, by means of an improvised plane shown in the drawing, if a regular carpenters' molding plane is not at hand. The homemade tool consists of two pieces of wood, grooved along the bottom edge to provide chip clearance, and diagonally to accommodate a cutting blade. The blade can be made from a section of discarded file or similar steel, one end of which is ground and carefully whetted down to a sharp cutting edge shaped to produce the beading desired. It is clamped between the two sections of the holder and two bolts or screws keep them together securely. Molding should be made from close-grained wood.

Pyrethrum-Soap Spray

Pyrethrum powder is non-poisonous to humans, and can be applied to vegetables or fruits just previous to consumption, but it is deadly to many insects. It can be applied with safety to tender plants without running the risk of burning the foliage or discoloring the flower. It is easily sprayed with a dust gun. I have used this remedy successfully against the cucumber beetle, potato bug, cabbage worms, roaches and flies, as well as against the Japanese beetle. Spray the soap around the walls of your rooms, and a few minutes afterward you can sweep up dead flies on the floor.—August Jeffers, Louisville, Ky.

Pipe Frame on Auto Holds Canoe

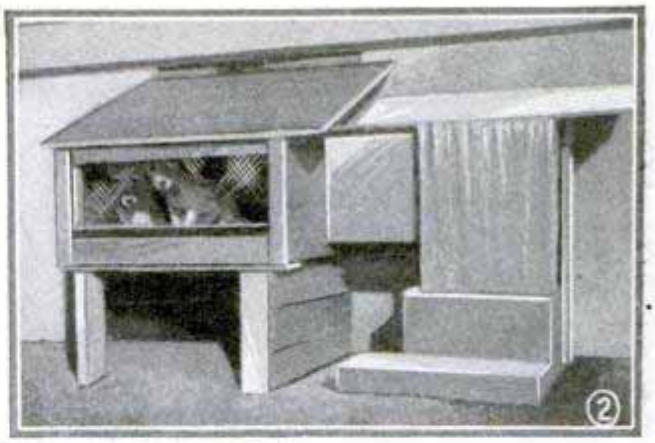
It is often rather difficult to find a suitable method of carrying a canoe on an auto when going for a camping trip. The writer made a special frame of pipe for this purpose, which can be attached or detached in a few moments, is not in the way, and has proved satisfactory in every respect. The canoe is held in place on the frame by means of thumbscrews and heavy trunk straps, the latter being slipped over the bottom as indicated. An outboard motor for the canoe was securely attached to the spare-tire holder.—E. S. Mason, Norwood, Ohio.

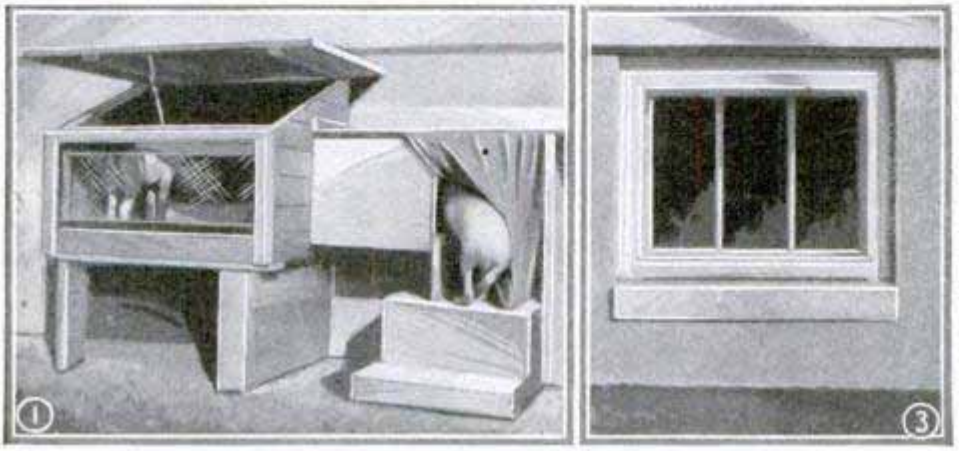


Pipe Frame on Auto Makes a Strong Support for the Canoe When Out on a Camping Trip

Portable Heated Dog House

The portable house shown in the photos is used during the winter to provide a comfortable place for my dogs, and is accessible to them at all times. When warmer weather arrives, it can readily be detached from the basement-window sill to which it is fitted, and stored until it is again needed. With this arrangement, the dogs, while out of doors, have access to a sleeping and lounging compartment of practically the same temperature as the basement, which is heated by a furnace. The window is, of course, kept open and a screen is substituted. The house is made of tongue-and-grooved stock and is lined throughout with paper. Any opening at the joint between the dog house and the frame of the cellar window is stuffed with cotton, to prevent cold air from entering the basement. The dogs enter through a vestibule in which four curtains, spaced 6 or 8 in. apart, are hung. After a dog has passed under them, they drop back so that very little cold air gets inside.—F. C. Manning, Newark, N. J.





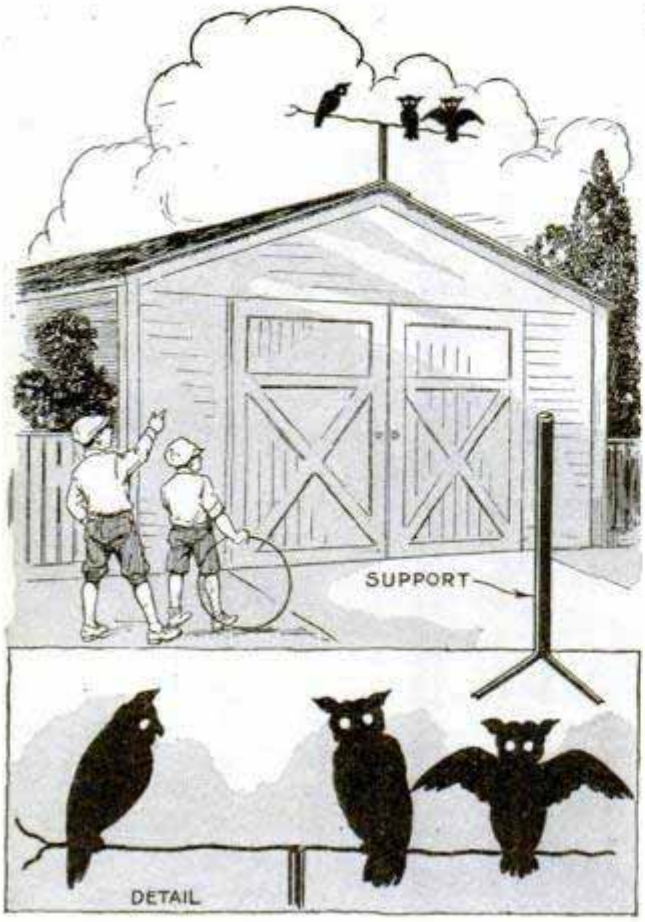
Comfortable Winter Quarters for Dogs Are Heated with Warm Air from the Basement; the Entrance Has Four Curtains to Keep Out the Cold Air

Preserving Old Leather

Leather, when old, often cracks on the surface and becomes "powdery." To prevent this, a good dressing can be made from the following ingredients; lanolin (anhydrous) 14 oz.; beeswax, 1 oz.; cedarwood oil, 2 fluid oz., and hexane, 22 fluid oz. First dissolve the wax in the hexane in a warm place, taking care to keep the latter away from fire as it is inflammable. The cedarwood oil is then added, and lastly the lanolin, which should be softened by warming it. Before applying this mixture, wash the leather with soapy water and let it dry in a warm room for two or three days. Some of the dressing is then rubbed in with the hands. The leather will feel greasy, but after 48 hours it will be quite normal. When the dressing has been thoroughly absorbed by the leather, it may be polished. The effect of this dressing is to soften the leather and restore its freshness.

Lock for Sliding Windows

Sliding windows of the kind used on sun porches are sometimes left unlocked unintentionally. An automatic lock is shown in the drawing. One leaf of a narrow hinge, about 3 in. long, is screwed to the window frame on the side opposite the stop. The hinge should be set so that the free leaf forms an angle of 10 or 15° with the window slide when it drops into a recess cut in the latter, as shown. To open the window raise the free leaf with one hand and slide the window back with the other. The hinge pin should be kept oiled so that the leaf will drop into the recess by its own weight when the window is closed.—Frank W. Harth, Bayside, N. Y.



Novel Weather Vane Comprising Three Wise Owls Sitting on a Twig

Novelty Weather Vane

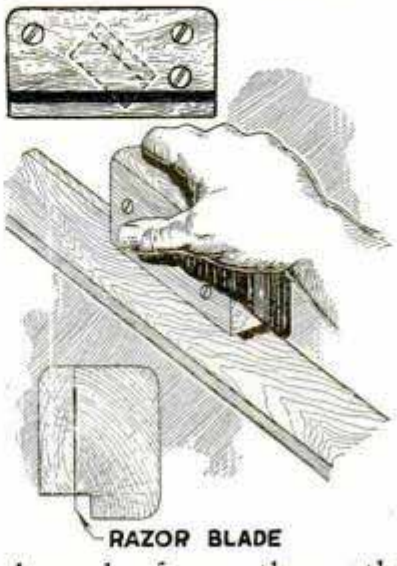
This weather vane works as well as any other type and will attract attention. Three wise owls in varying poses offer the necessary resistance to the wind to turn it. The birds are cut from rather heavy sheet metal with a cold chisel, and are then brazed or riveted to a rod which is hammered out to resemble a tree twig. To the center of this twig a small straight rod, with its lower end pointed, is riveted or brazed. This rod is set in the end of a vertical gas-pipe support, which is split and bent at its lower end and drilled so that it can be attached to the roof with lagscrews. A hardwood plug should be driven into the lower end of the pipe before it is placed in position, to provide a support for the pivot rod. Pour some oil into the pipe so that the rod will not rust. Painting the tree twig black and owls black with white eyes completes the vane. The size, shape and arrangement of the birds on the vane in the drawing must be followed, for one side must offer greater resistance to the wind than the other, or the vane will not turn into the wind.—Dale R. Van Horn, Lincoln, Nebr.

Cleaning Paintbrushes

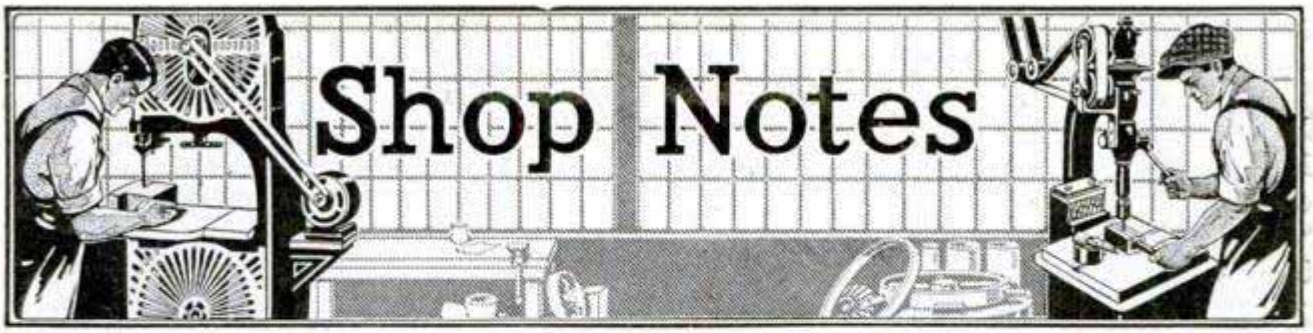
Turpentine is one of the most satisfactory materials for washing paintbrushes, but it is expensive. Unless the turpentine can be used again in paint after washing the brush, the cheaper kerosene will do as well. After washing with kerosene, rinse in gasoline and shake out thoroughly. If brushes are to be put away for some time they should be well washed with soap and water, thoroughly rinsed in clear water, and then hung, with the bristles down, to dry. Brushes that are to be used in a few days may be hung into a can of kerosene or turpentine with the bristles submerged. Drill a hole through the handle of the brush for a wire hook so that the brush can be suspended from the edge of the pail, without touching the bottom.—A. T. Bowden, Ottawa, Can.

Improvised Strip Cutter

Small strips of wood, such as are used in the construction of kites, model airplanes, etc., are very often difficult to obtain. The writer found that the wood from which yardsticks are made is a very suitable material for such sticks, and it is easily cut into strips with a safety-razor blade. A suitable holder for the blade is made from two pieces of hardwood, held together by three screws that serve to clamp it firmly. The blade is set at an angle to make it cut easier. The lower edge of the guide block is grooved 3/16 in., or the width of the strip that is to be cut.



In using the cutter hold it rigidly up against the wood and push along, being careful not to bear down too hard for the first time. Cut about halfway through the wood, then turn it over and cut it through from the other side.—Chas. Homewood, Hollywood, Calif.



All Shop Notes published in 1927, in book form—Fifty Cents—from our Book Department

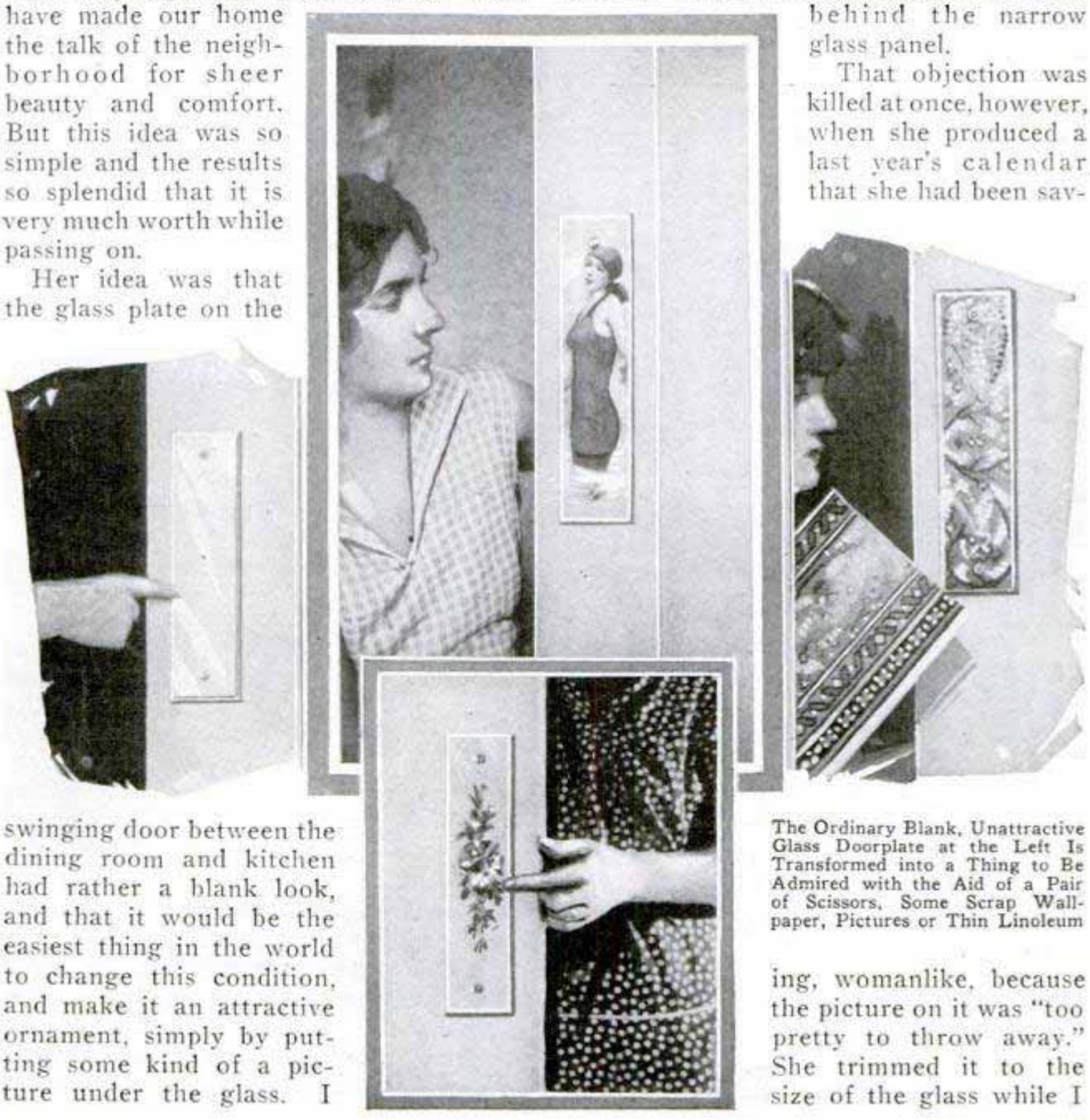
Artistic Doorplates Beautify Home

By MAURICE M. CLEMENT

THE other day my wife had an idea. Not that this is anything to rush into print about; she gets them often, and her ideas have made our home the talk of the neighborhood for sheer beauty and comfort. But this idea was so simple and the results so splendid that it is very much worth while passing on.

Her idea was that the glass plate on the swinging door between the dining room and kitchen had rather a blank look, and that it would be the easiest thing in the world to change this condition, and make it an attractive ornament, simply by putting some kind of a picture under the glass. I objected immediately that, while the idea was a good one, I didn't want to go downtown to hunt for a picture that would fit behind the narrow glass panel.

That objection was killed at once, however, when she produced a last year's calendar that she had been saving, womanlike, because the picture on it was "too pretty to throw away." She trimmed it to the size of the glass while I



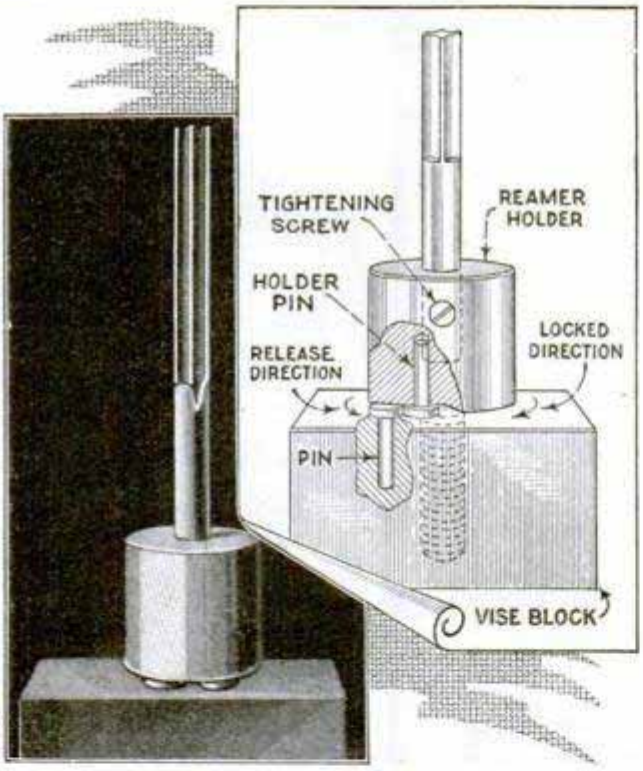
The Ordinary Blank, Unattractive Glass Doorplate at the Left Is Transformed into a Thing to Be Admired with the Aid of a Pair of Scissors, Some Scrap Wallpaper, Pictures or Thin Linoleum

got the screwdriver, and a few minutes later we stood back to survey our work. "Isn't it beautiful?" cried my wife, her face aglow. I was compelled to admit that it was. "What about the plate on the other side of the door?" I demanded. "It's inside the kitchen, and hardly anybody ever sees it. Why not stick an old piece of linoleum or wallpaper under the glass?" This I said in jest.

She opened the door and looked thoughtfully at the inside plate. "An excellent suggestion," said she. "We have two fine pieces of figured linoleum and a dozen small pieces of wallpaper in the garage. Get them, and we'll see how they look." It was useless to protest that I was only joking, so I got them, and, before the evening was over, we had learned many things about "picturizing" doorplates. For instance, the linoleum and wallpaper suggestions which I had offered in a facetious mood proved to be an absolute knockout. Three other calendars furnished subjects for as many plates. Popular magazines of the larger size yielded innumerable pictures, drawings and reproductions of oil paintings fit to put under glass. Several decalcomania designs mounted on parchment proved particularly attractive.

Non-Reversible Reamer Holder

When hand reaming is done with a reamer held in a vise and the work in the hands, it often occurs that the work is revolved toward the left when it is removed from the reamer. This soon dulls the edge and spoils the tool for finishing work to size. A good method of avoiding this trouble is to use a vise holder like that shown in the photo and drawing. It locks when the reamer is used in the ordinary way and releases when the opposite movement is attempted. To make the device, take a piece of square or rectangular steel, drill and tap it in the center. Next make the reamer holder of round steel, threading it on one end to fit the tapped hole in the block and drilling it out at the other end to take the reamer. Drive one pin into the block and another into the holder, their heads being slightly less in thickness than the pitch of the thread in the block. The pins will prevent the holder from turning when it is used in a right-hand direction, but when used in the opposite direction the holder itself turns. One revolution clears the heads of the pins so that further turning the work in the wrong direction only results in unscrewing the holder.—Harry Moore, Rosemount, Can.



Holder Which Prevents Turning the Reamer in Left-Hand Direction

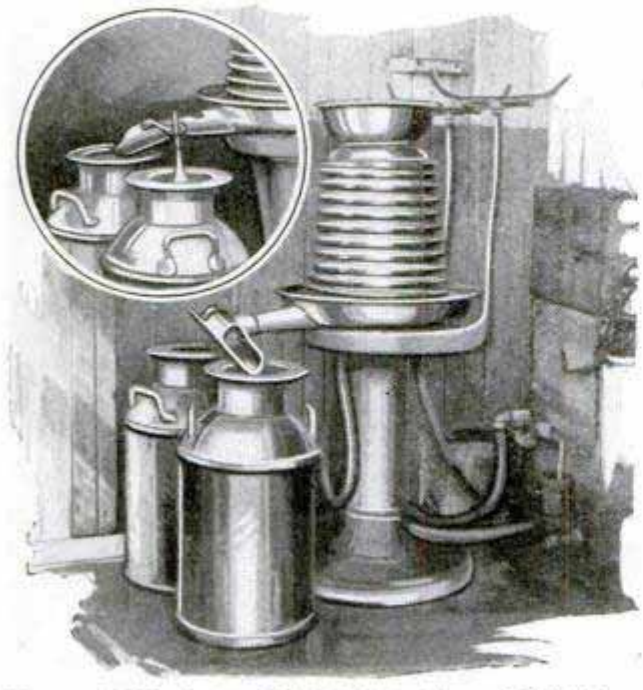
Using Erasers

To erase fine lines use a sharp or narrow-edged eraser. When erasing broad or thick lines hold an eraser at an angle of about 15° to the surface of the paper, alternating the sides of the eraser. This procedure will prepare the eraser for the finer lines. It will be found that better work can be done by erasing a small section of the drawing and redrawing than by using an erasing shield. The eraser should always be used carefully. If the surface of the drawing paper or tracing has been roughened by careless erasing, the drawing will gather dirt. Never use an ink eraser on tracing cloth. It takes longer to erase with a soft eraser, but the surface is left smooth and the ink will flow better when applied. When an eraser becomes hard and smudges the drawing,

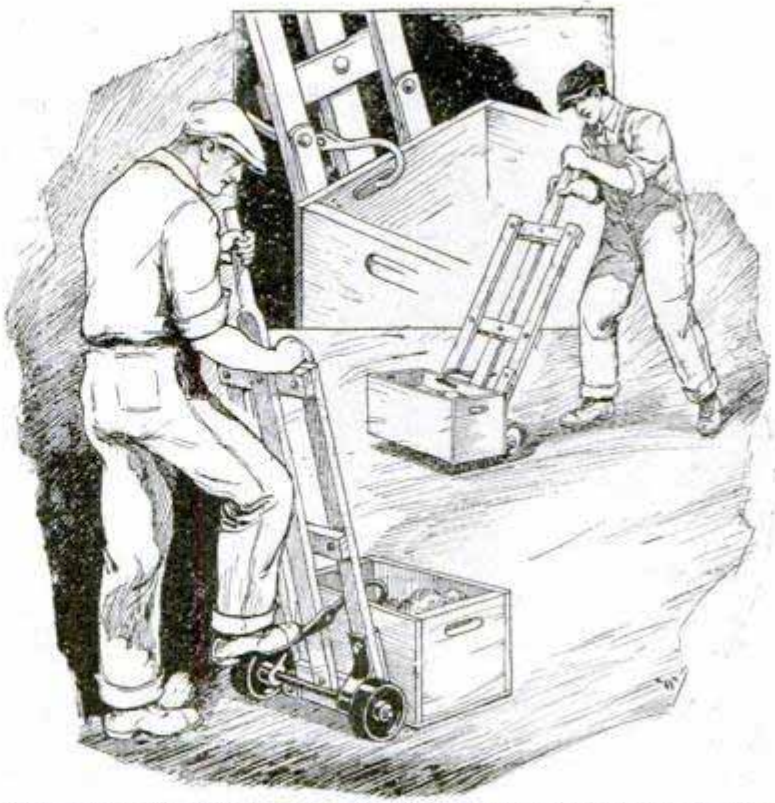
it can be restored to good working condition by rubbing vigorously on a clean piece of drawing paper. If you have roughened tracing cloth by erasing, the ink will have a tendency to spread. This can be prevented by dusting the surface with soapstone or ordinary talcum powder, and wiping off the surplus before applying the ink.—Frank N. Coakley, Buffalo, N. Y.

Milk-Cooler Spout Shifts Automatically

The accompanying photo shows a milk cooler on the farm of L. C. Young, of Montgomery, Ala. The delivery nozzle of the cooler is equipped with a double, tilting spout, of such a length that it can discharge into either one of two cans placed as shown. The spout is fitted with a float, which is dropped into one of the cans, so that this can will be the first to be filled. As the milk rises in this can the float also rises, until, when the can has been filled to the proper level, the float tilts the spout so that it discharges into the empty can. Each can is filled uniformly, and all the operator has to do is to have an empty can ready to replace the filled one.—J. C. Allen, Lafayette, Ind.



Spout of Milk Cooler Which Shifts Flow of Milk from Full to Empty Can



Iron Hook Pivoted to the Center Bar of a Truck Facilitates Handling Tote Boxes

Adjustable Tote-Box Truck Handles Boxes of Varying Height

In a shop where small or medium-sized tote boxes are used, it is an easy matter to arrange a truck to carry them about from place to place. An iron hook is pivoted to the center bar of the truck frame, as shown, so that it can be slipped over the edge of a box, while the rear part is used as a foot lever to raise the hook. The latter should be heavier than the pedal part so that it will not slip off the side of the box. A number of holes are drilled at regular intervals in the center bar so that the hook can be attached at various heights to suit boxes of different sizes. The device is held in place by a bolt and nut.—Avery E. Granville, Cleveland, Ohio.

Homemade Floor Oil

A mixture of equal parts of turpentine and linseed oil is recommended for pine floors. Most floors will readily absorb two applications of this mixture, and it will leave no objectionable coating. For varnished floors, use one part of linseed oil to three of turpentine. Barely moisten the mop with the preparation. An occasional slight oiling prolongs the life of varnish considerably.

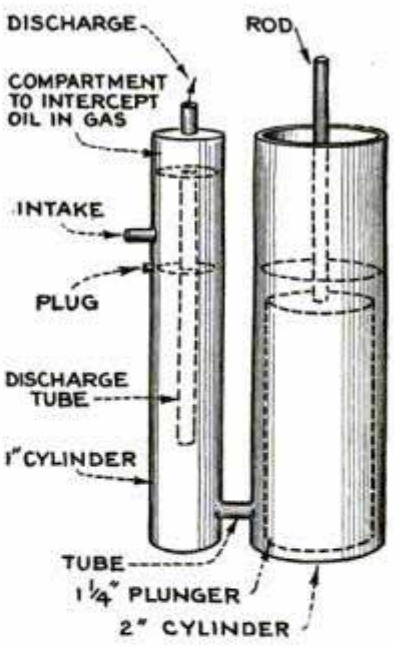
Non-Slip Base for the Camera Tripod Can Be Made of Furniture Webbing

Cure for Slipping Tripod

The accompanying drawing shows a simple device which will prevent a camera tripod from skidding when it is set on steep or slippery inclines, or on polished wooden or marble floors. It consists of three strips of heavy webbing, each 22 in. in length and arranged to form a triangle, as indicated. At each corner a piece of rubber, ¼ in. thick, which may be cut from a discarded auto tire, is placed underneath the webbing, the straps overlapping above it. A sheet-metal socket for the tripod leg is placed on the webbing at each corner and the assembly riveted together.—Leslie H. Phinney, Springfield, Mass.

Oil-Seated Valves for Hydrogen Sulphide

In order to prevent valves of the ordinary type from clogging up when used for hydrogen sulphide, and to forestall the loss of gas with its attendant discomfort, often caused by careless students, special valves have been installed by the University of Oregon in the chemistry laboratory. In the construction of these valves use was made of an oil-sealed trap. Each valve consists of two cylinders, approximately 13 in. in height, and connected at their bases by a small tube. The larger cylinder, which is made of 2-in. galvanized-iron pipe, contains a plunger of 1¼-in. pipe, 8 in. long and plugged at both ends. The plunger, of course, makes a sliding fit in the cylinder, and can be raised or lowered by means of the rod screwed into one of the plugged ends and extending through the top. The smaller cylinder, made of 1-in. pipe, is tapped and fitted for two ¼-in. gas connections. The intake is located about 4 in. from the top, while the discharge pipe goes through the closed top of the cylinder and extends downward 8 in. Both cylinders contain oil. The desired level of oil can be maintained by means of a small drain hole fitted with a removable plug about halfway up on the smaller cylinder. When the plunger is down, the surface of the oil is at its highest, that is, even with the plug. It is also about 3 in. above the end of the discharge pipe which dips into the oil and consequently is effectively trapped, or closed. When the plunger is lifted, the oil level falls below the open end of the discharge pipe, and the gas that was confined in the chamber above flows out. When the plunger is released, it settles back and the oil level rises again, automatically sealing the discharge. Pressure in the gas mains is regulated so that it never exceeds the pressure of the 3-in. column of oil. To prevent oil from being blown out of the discharge pipe, a small compartment has been provided in the top of the smaller cylinder to stop the oil while gas is flowing. Mica gaskets with a tiny perforation are put in the unions on the intake line, close to the valves, in order to cut down the flow of gas to the valve, as a great quantity is never desired. A wooden box, 14 in. high, 6 in. wide and 3 in. deep, houses the assembly.

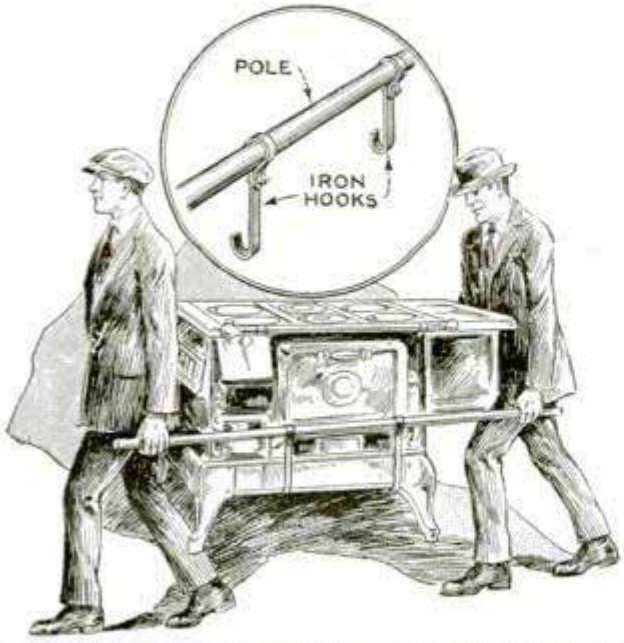


How to Remove a Broken Spindle Bolt

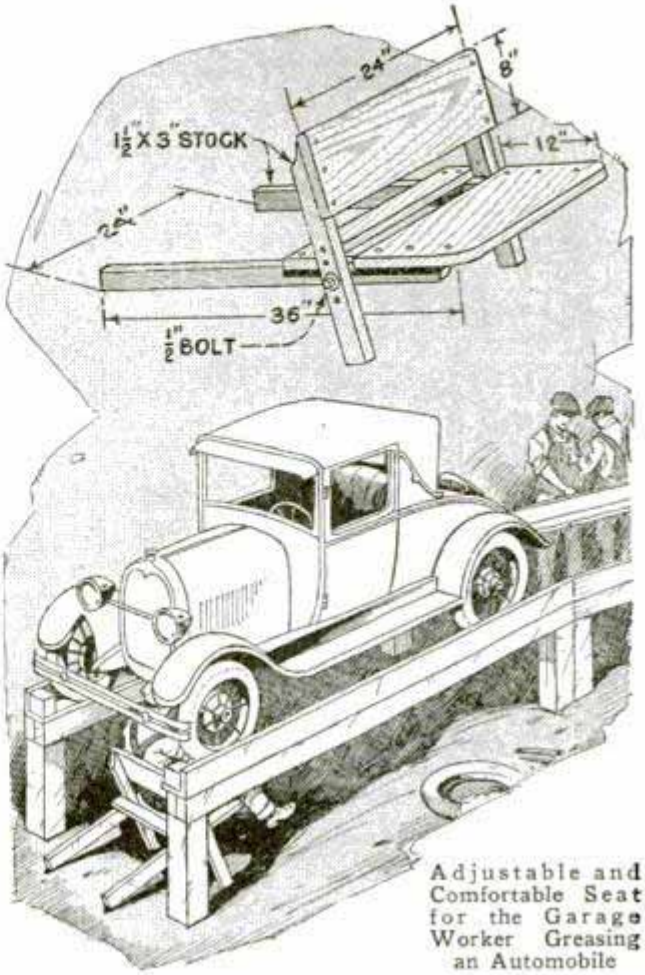
I had to remove a broken spindle bolt from the axle fork of a Chevrolet. I had intended to saw a slot in the bottom of the bolt and turn it out with a screwdriver, but the bolt was casehardened and this made sawing impossible. I first took off the nut and washer, after which the threads at the bottom were well doped with rust-removing fluid. The bolt was then turned as far as possible by means of a punch stuck into the cotter hole. A piece of 20-gauge soft-iron wire, about 3 ft. long, was wrapped once around the bolt where the washer had been, and, while both ends of the wire were held firmly in the hands, a steady pull was exerted toward the left. The friction of the wire loosened the bolt, although it had been in place several years.—Neil Nelson, Kansas City, Mo.

Moving the Kitchen Range

One of the most awkward and heavy articles to move about is a kitchen range, and as nearly all the individual parts are castings, care must be taken to avoid breakage. To facilitate the task, two 5-ft. lengths of 1½-in. iron pipe, with hooks attached, as shown in the detail, can be used. The handles extend beyond the ends of the stove, and two men can readily carry it. Hardware dealers will appreciate a pair of these handles.



Carrying a Range with the Aid of Two Handles Fitted with Hooks



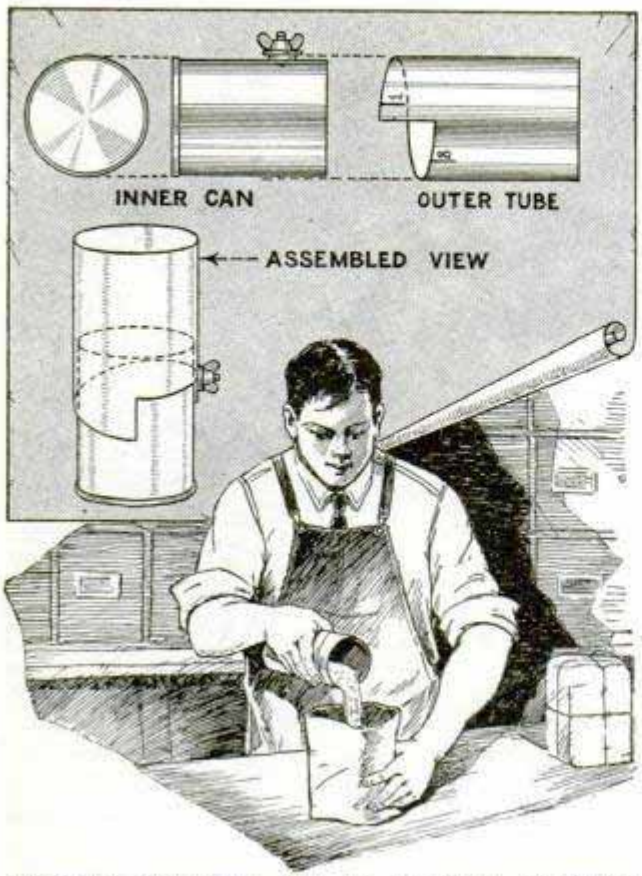
Adjustable and Comfortable Seat for the Garage Worker Greasing an Automobile

Seat for Auto Greasing Attendant

After going to the trouble of providing the garage with two of the usual inclines, so convenient for greasing and repair, it was found that their use caused more or less discomfort for the attendant working underneath. After some consideration, the problem was solved by providing a seat as shown, which can be adjusted to suit the worker. Two boards make up the seat and backrest, four lengths of 2 by 4-in. studding form the frame, and two small bolts hold the separate parts together, while holes in the backrest sidepieces permit adjustment.

Steel Wool for Oilcan Strainer

The man who wants to keep his oil as free from dirt as possible, will find it advisable to put some sort of filter at the base of the spout. A piece of fine copper or brass gauze is commonly used for this purpose, but if it cannot be obtained, a small wad of steel wool may be substituted. This makes an excellent filter and is even better than gauze, but it should be changed often.



Adjustable Measuring Can for the Shop Eliminates Guessing and Weighing of Small Material

Adjustable Measure for the Shop

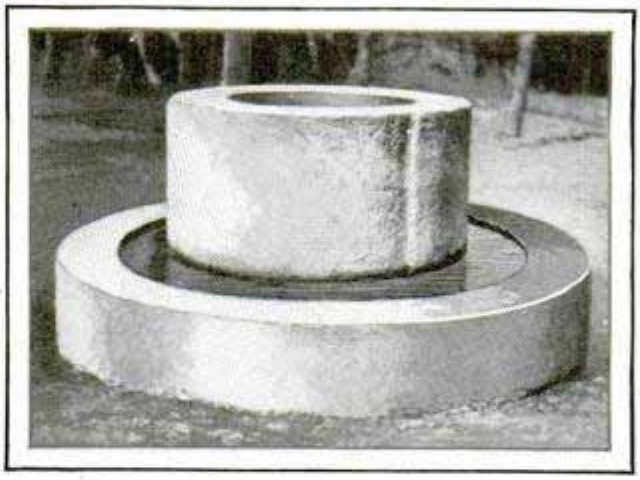
Factory stockroom workers who issue materials by weight can save a lot of time by using the adjustable measuring can shown in the illustration. One of these, kept in a barrel of material for which it is to be used, can be quickly adjusted to measure any quantity within its capacity, and so save the trouble of guessing or weighing it. Two lengths of tubing of convenient size are required, one to slide within the other. The inner one is closed at one end by soldering a flat disk to it, and the edge of the outer tube is cut to a spiral, as indicated. Drill a hole in the inner tube for a screw and use two washers, one a little thinner than the tube and the other large enough to tighten on the outer tube when the wingnut is turned. Make a mark on the inner tube and graduate the outer tube, along the spiral, in sections to correspond with the weight contained in the can when the outer tube is turned to bring the marks in line. In use, the nut is loosened and the outer tube turned to one, two or three ounces, or pounds, as the case may be, the nut is tightened, the can filled to a heaped measure and leveled with a stick.

How to Cool a Hot Bearing

Some machine bearings continue to get very hot no matter how much ordinary oil or lubricant is applied. Even when mixtures of oil and graphite, powdered mica, soapstone, etc., fail to reduce the heat, there is one substance, namely coconut oil, that I have seen tried a number of times, and in every case the bearing, to which it was applied, cooled down and the machine was kept running without a shutdown. Even after the bearing gets very hot, the use of this oil will generally cool it in a short time. On bronze and brass bearings coconut oil seems to work like magic. In cool climates the oil may get too thick to be fed from an ordinary oilcan, but a little heat applied to the can will thin the oil. A bearing cooled by using coconut oil does not require flushing out after its use, as is necessary when mica, soapstone or some other "last-hope" remedy is tried.—James E. Noble, West Vancouver, Can.

Watering Trough for Hogs

Hogs like to wallow in mud and water, and will upset any ordinary trough. A Texas rancher made the circular concrete trough shown in the photo, which cannot be overturned. It has a float in the center which, when properly adjusted, keeps just



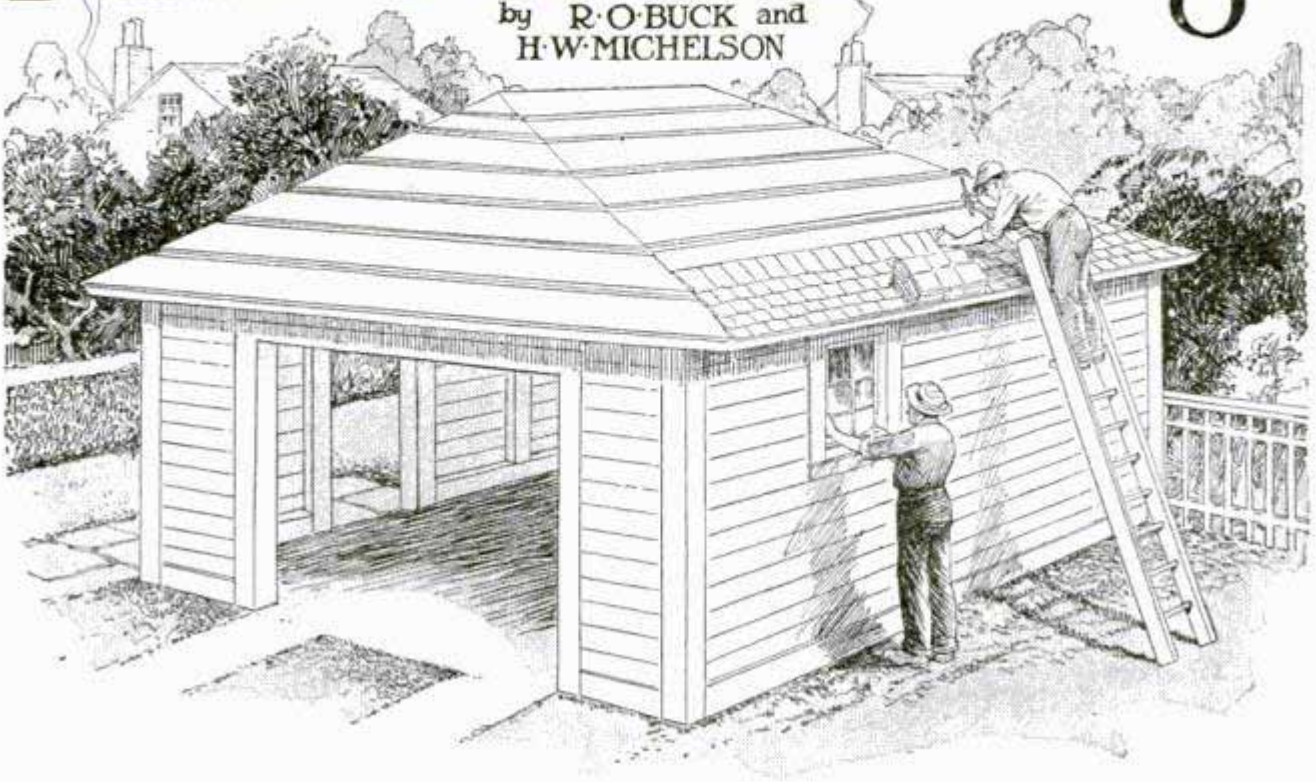
Circular Concrete Watering Trough for Hogs Cannot Be Overturned

enough water in the trough for the hogs. —L. A. Wilke, Fort Worth, Tex.

¶When filling nail holes in yellow pine, use beeswax instead of putty, as it matches the color well.

Build Your Own Garage

by R·O·BUCK and H·W·MICHELSON



PART II

THE building is now ready for siding. This should be done before putting on the roof boards so that the top pieces of siding can be notched to fit around the rafters, with the top edge flush with the bottom surface of the roof boards. Do not fail to do this, as it is much more difficult to block the openings between the plate and the roof boards after the roof is on.

There are several types of siding on the market, the most popular of which are shown by Fig. 8. It is advisable to choose the type that will match your house best. Before putting the siding on, I covered the studs with a heavy building paper, placing one length of paper on at a time, starting from the bottom, and boarding over this until I reached the top of the paper, after which another was applied in the same manner. The paper makes the garage wind-proof and much warmer. The siding was sawed flush with the two-by-fours that formed the door and window openings. By following this method, only a few hours were required to inclose the entire garage.

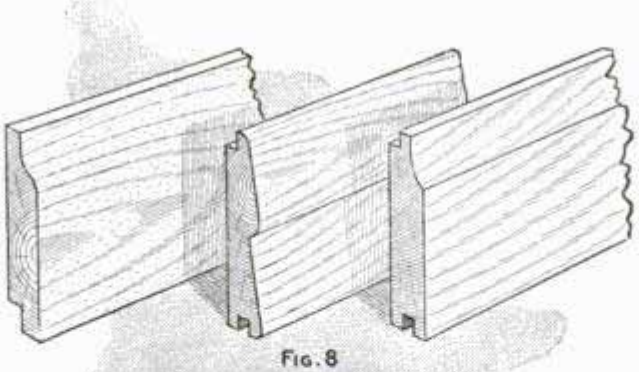


Fig. 8

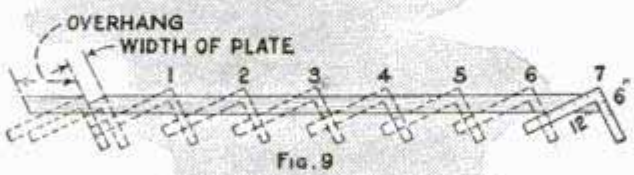


Fig. 9

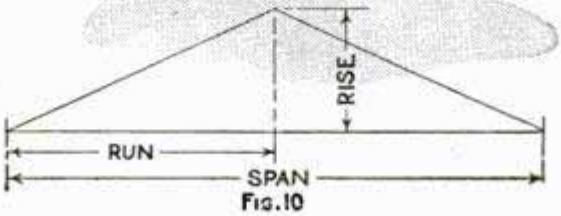


Fig. 10

Putting on the roof boards was now in order, and I found that this was going to be more of a problem than an ordinary gable roof would be, as all of the

corners over the hip rafters had to be mitered. This cut can be handled very well, however, if you follow the method I used. Starting from one side of the roof and at the bottom, lay the boards in the position shown by A, Fig. 12. After two or three boards have been nailed in place, saw the ends along the hip rafters even with the edge marked as indicated at B. This cut, of course, is at right angles to the face of the board, but follows the slant of the hip rafter. Continue the roofing all the way to the top in this manner and repeat the procedure on the opposite side. After both sides are covered and the ends sawed, a similar arrangement may be used for the ends by butting the boards D against the sawed edges of the boards C. The ends of these boards are then sawed off flush with the face of the boards that form the side covering.

Matched material of a fair grade is best for roofing, although builders use just ordinary No. 2 boards, with the edges butted. Joints between the ends of roofing boards should come over a rafter, as otherwise there is danger of the board warping, tearing off the tongue, and making a hole in the roofing. The roofing boards should be started about 1½ in. beyond the ends of the rafters so that water will be carried beyond the facing strips which are to cover the rafter ends.

On my garage I used individual asphalt shingles of the same color as those on the house. I laid them 4 in. to the weather for the same reason, although I believe the general practice is to lay them with

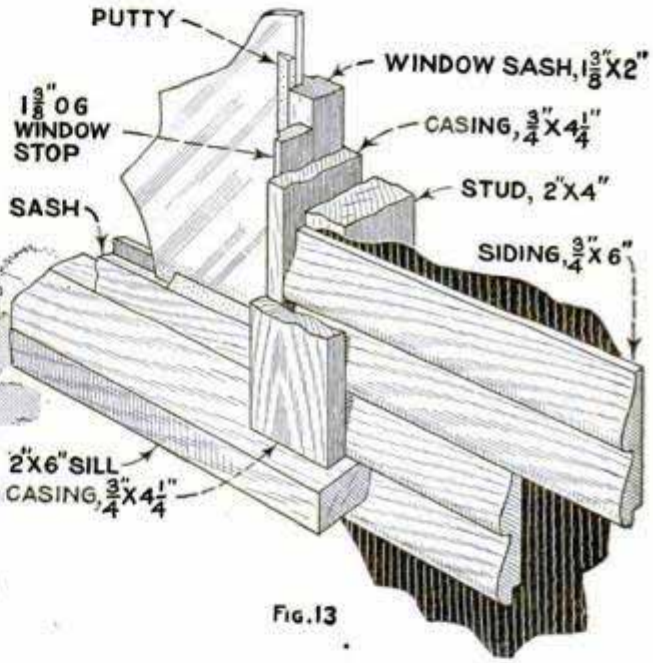


Fig. 13

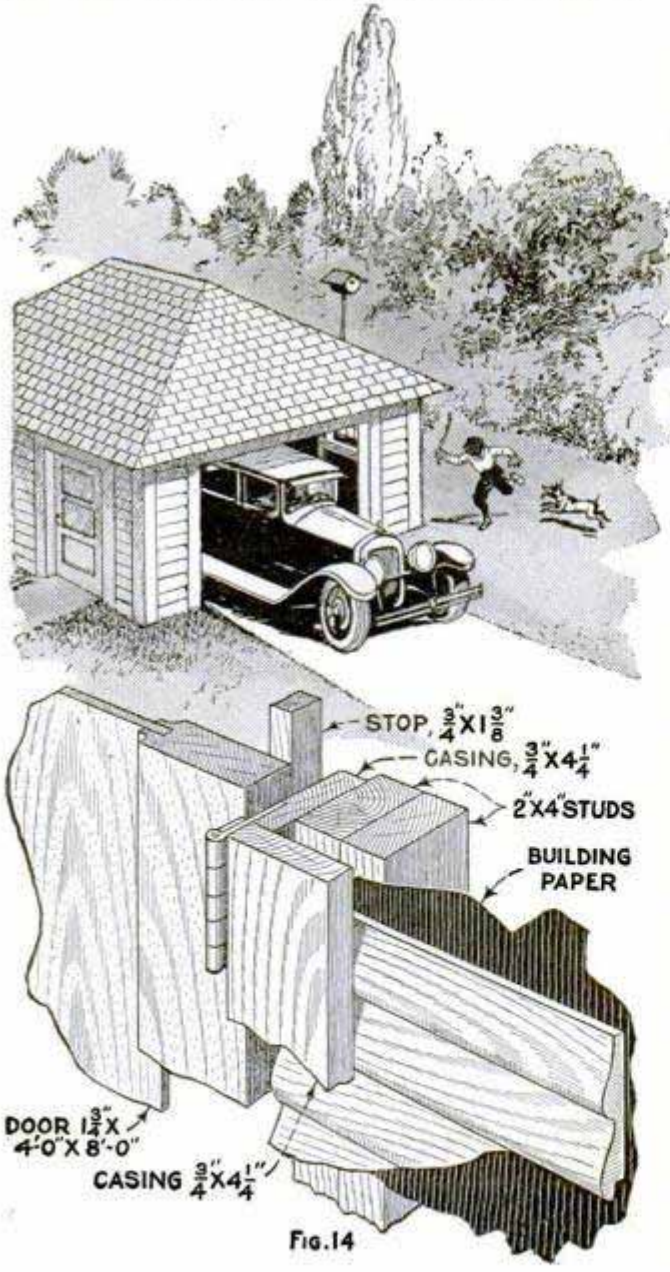


Fig. 14

5 in. exposed. Roll roofing is cheaper but not so good looking or serviceable, yet very satisfactory. Roofing of either kind is always laid from the bottom up, so that the lap is on top. The roof on the garage is flat enough for you to stand on while working, but unnecessary walking on asphalt roofing should be avoided, as much of the gravel or slate is loosened or rubbed off, resulting in unsightly black spots on the roof.

Putting on the trim, hanging the doors and windows, etc., is the pleasantest part of the job, or so it seemed to me at least. You are beginning to see the results, the structure looks like a garage and you can visualize it with a tidy workbench, shelves and cases in position, as well as a snug

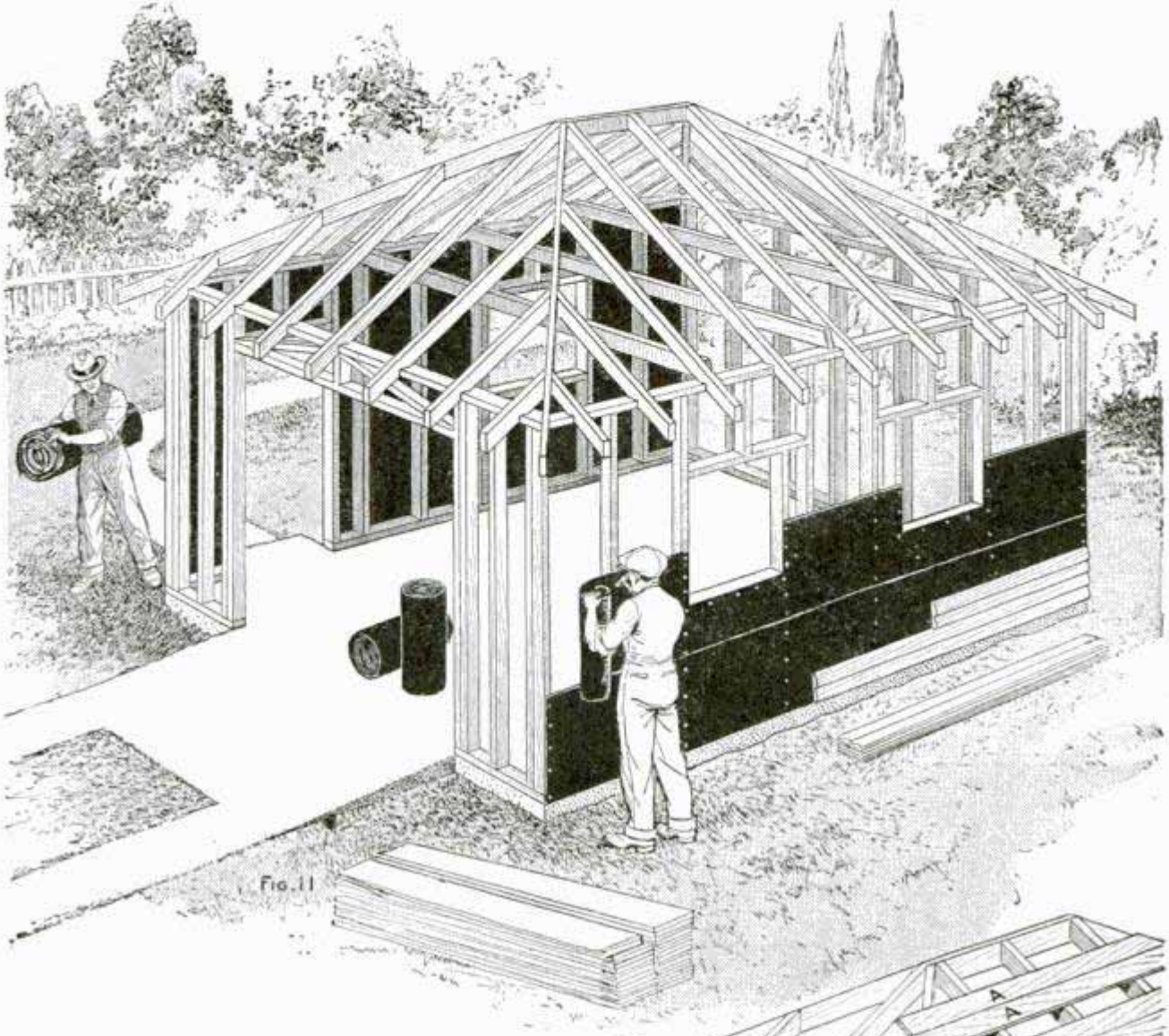


Fig. 11

berth for the "little old boat." Perhaps I felt a bit glad, too, that the rough part was finished for I would rather work with the white pine in the doors and windows.

The series of detail drawings, Figs. 13 to 17, show you just how to put on the trim for the corners, cornice, windows and doors. They detail the garage exactly as I built it, with the exception that no window is shown in the back wall. I put a window in the end toward the alley, but found it of so little use that I have omitted it in the drawings. You will use your own judgment about this.

Fig. 13 is a section through a window, showing the sash, frame, casing and sill. The sizes and spacing of all these pieces are given in the sketch. The frames I made myself, buying only the sash ready-made and glazed. A 2 by 6-in. plank, planed as shown, makes a good sill, and as no machining was necessary, I used ordinary dimensioned lumber to make the rest of

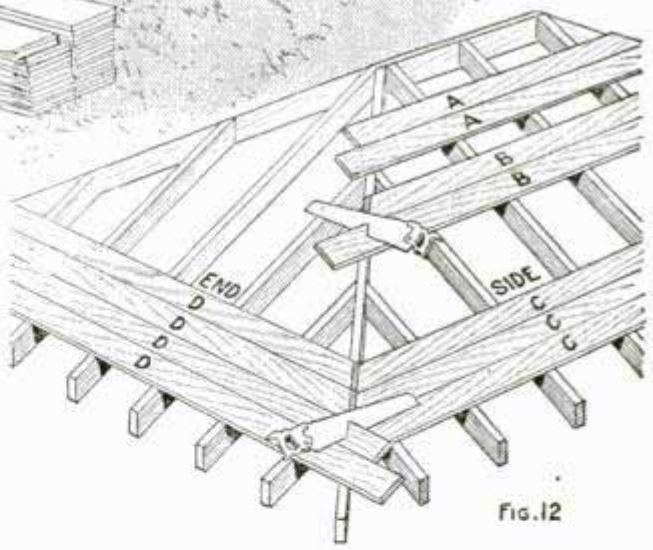


Fig. 12

the frame. Ogee (OG) stops can be obtained at any millyard for a small sum.

The large doors were purchased from a mill company as I did not think that I could build doors that would be nice-looking enough for the front of the garage. However, if your garage faces the alley, it would be entirely possible for you to build the large doors with ¾-in. matched and beaded ceiling material, which would be satisfactory. Fig. 14 shows how to case the doorway, place the stops, etc.

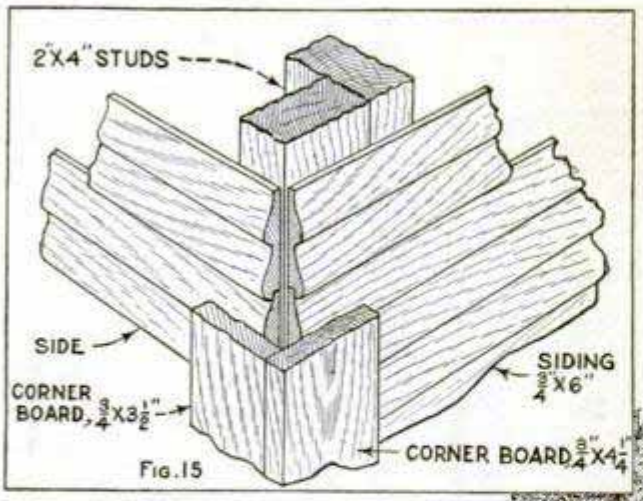


Fig. 15

as this will result in a tighter corner joint.

Fig. 16 shows a section of the service door. I used an ordinary five-panel pine door and rabbeted frame, which I purchased at the mill complete. This door

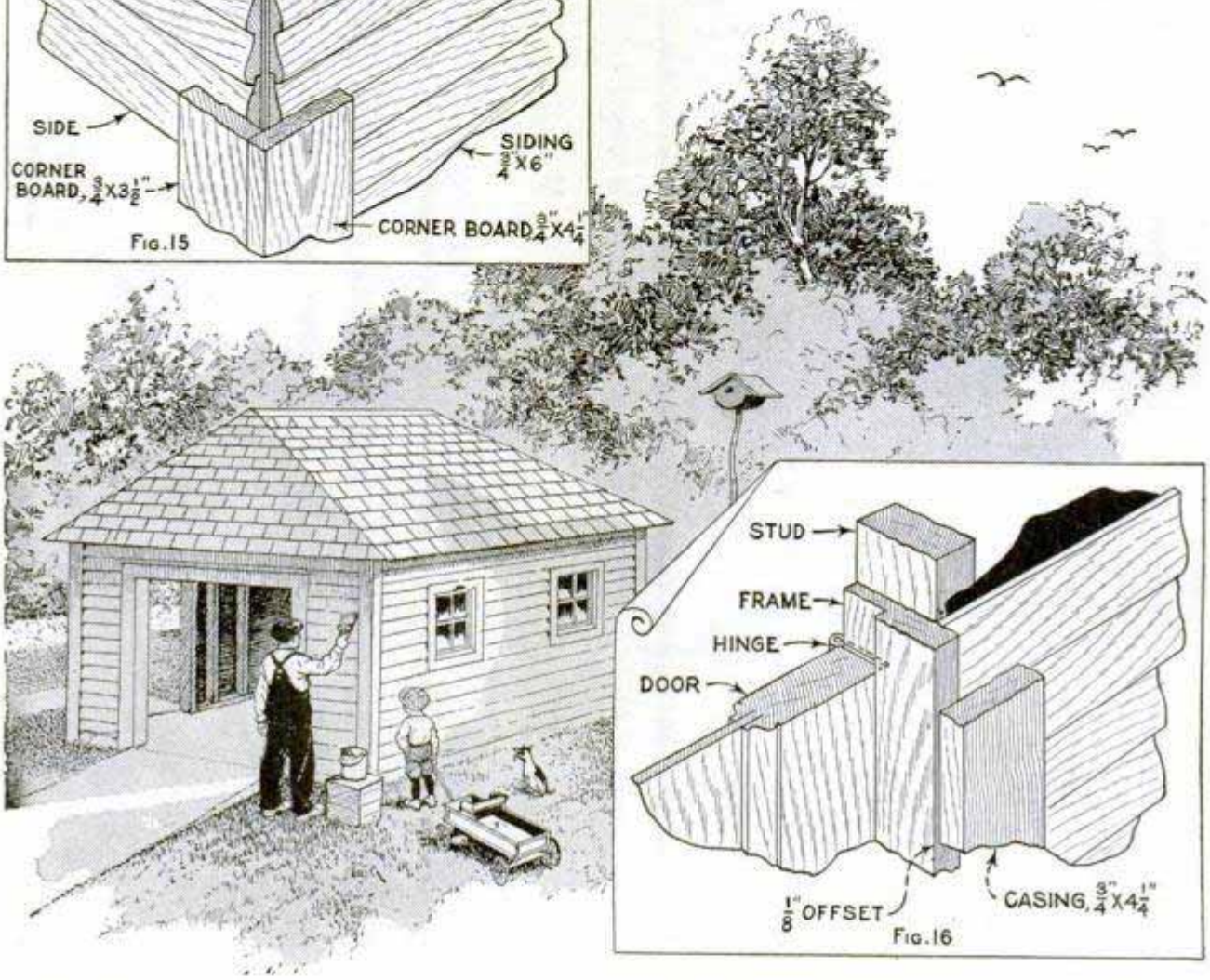


Fig. 16

The doors may be hinged or run on one of the various types of tracks on the market. I used a three-section door on a track for my garage and find it very satisfactory. This type has one of the doors hinged to one side of the opening and the other two hinged to the opposite side, and folding against each other. The purpose of the track, which is on the outside, is to carry the weight of the center door. The "roll-around" type of door is also very convenient, as the three doors roll against the inside of one of the side walls. In some cases, however, this is an objection, as it makes that part of the wall space useless for any other purpose.

Fig. 15 shows the method of placing the corner boards and is self-explanatory. It is customary to nail the boards together in a trough-shape before putting them up, swings in. A lock is advisable. Around the rafter ends, I placed a facing strip, 4½ in. wide, as shown in Fig. 17. The lower side of the rafters I also cased in with ⅝-in. matched and beaded material.

My purpose in using so wide a facing strip was to give the effect of lowness, as my house is a bungalow. However, in the case of a two-story house, it may be advisable to secure the opposite effect, that is, one of height, by making the facing strip narrower. If the overhanging ends of the rafters are ripped along a line level with the top of the plate notch, you can use a narrow strip in the same manner. Many garage builders omit the cornice and facing strip entirely and leave the rafter ends exposed. I do not believe this makes as nice-looking a garage.

Not content with a facing strip, I placed

a box-type gutter completely around the garage, with downspouts at the ends toward the alley. This finishing touch completed the garage with the exception of painting, but it nearly finished me as well. I had so much trouble hanging and soldering the eaves trough that I am sure I would not attempt to put one up again, and unless you are experienced in that kind of work and have a tinner's equipment, I advise you against it. For this reason I have omitted it from the drawings, though it is shown in the photo.

Three coats of good-quality paint are required. The color scheme, of course, should be in harmony with your house so I will say nothing further about this.

Electric lights are a great convenience in a garage and may be installed at very small cost. The supply line can either be brought in from the house by means of overhead wires or, preferably, by laying a two-wire lead-covered cable, which is inexpensive and can be purchased from most electrical dealers. The inside wiring I did with armored cable (BX) and the usual iron outlet boxes. The circuit (see Fig. 3, page 167, of the July issue) provides for a trouble lamp, a light at the front of the car and also one over the workbench. All are controlled by a single switch close to the service door. I find this very convenient and I believe it conforms with most city regulations.

If you submit the accompanying drawings to your dealer, you can obtain an estimate of the cost of material to construct this garage. Add to this an equal amount for your labor, and you will have the approximate cost of having this garage built by a contractor. My total cost for material, exclusive of the cement drive and approach, was $185, but this amount will vary greatly in different localities and according to the material used.

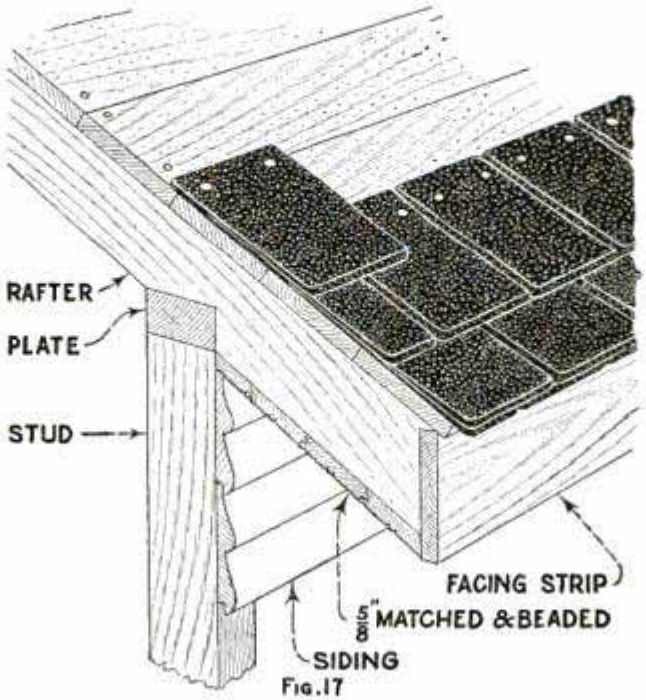


Fig. 17

I have endeavored to make the directions and drawings of the garage so simple and complete that you should have no difficulty in successfully constructing a well-built and serviceable garage; and if you find the pride and pleasure in it that I did, you will feel well repaid.

Copperplating Small Tools

Copperplating small hand tools is frequently desirable, as it provides an easy method of marking the tools for identification of ownership. Besides, in many shops where soldering is done and where soldering acids are kept on hand, steel tools tarnish and rust very badly. A light deposit of copper will prevent this. The apparatus and material required for this work are: a storage battery, fully charged, a handful of copper sulphate (blue vitriol); a vessel of suitable shape and dimensions for containing the article to be plated and a small piece of copper or some scrap copper wire Dissolve the copper sulphate in water. The strength of the solution is not important for this kind of plating and a small handful of the crystals will be enough for about 1 qt. of water. To the wire connected to the positive terminal of the battery fasten the piece of copper or a short length of scrap copper wire twisted into a compact wad. The article to be plated is connected to the negative terminal of the battery. Both the copper piece and the article are supported over the container so that they are completely immersed in the solution, keeping them separated from each other. The length of time required for the plating operation varies according to the thickness of the plating desired. A few moments is sufficient for a thin protective coating. To obtain uniform thickness, the article must be clean and bright.

Locking Clamp for Pump Pipe

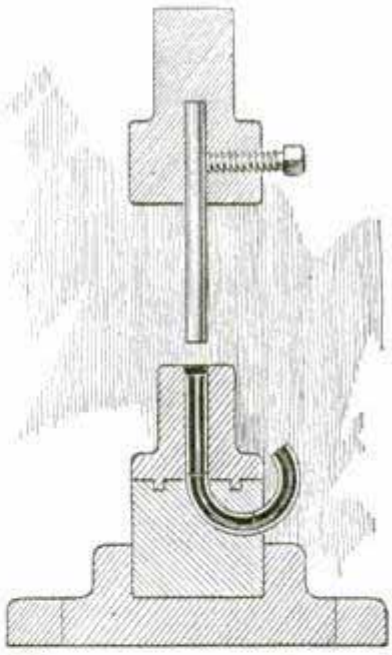
Anyone who has attempted to raise a water pump with a length of pipe attached to it knows that it is a hard task. When the pipe is raised halfway, the whole is top-heavy and almost unmanageable. Hence it frequently happens that it is dropped back into the well. The drawing shows a simple brace that catches the pipe at each lift, steadying it and preventing it from dropping back. It is simply a strip of flat iron, about 1½ ft. long. It is bent, and screwed to the well cover as indicated, the free end being rounded off to fit the pipe. After a lift has been taken, the clamp will automatically bind against the pipe and hold it until you have moved your hands for another lift.—C. M. Wilcox, Torrington, Conn.

Convenient Location for Auto Tool Box

Having other use for the running boards of its business cars, one concern disposed of the tool boxes in a novel place, namely, between the frame members where they extend in front. The customary running-board tool box, as a rule, will fit this space. It is located behind the bumper where it will not be easily damaged, and is, at the same time, readily accessible. The box is attached, at each end, by means of two bolts and wingnuts, the latter being inside of the box. The use of wingnuts is preferable to regular nuts as it may be necessary sometimes to remove the tool box in order to crank the car. As the box must be unlocked to remove the wingnuts, safety against theft is insured. This location for the box is especially convenient for tourists, as the running boards are loaded with other things, and the tool box forms a shelf in front on which a roll of baggage, the tent, or the like, may be packed.

Forming Small Brass Tubes

On one of the new radio devices several ¼-in. brass tubes, 1¾ in. long and bent to a quarter circle, are used. As these must be produced quickly and at as low a cost as possible, the method shown in the illustration was employed with satisfactory results. The forming device consists of a punch, or forcing tool, for driving the tubes through the forming-die hole. The upper part of the die is fitted to the lower part by tongues and grooves and the necessary dowel pins. The lower part is made in two pieces, each grooved to receive one-half of the tube. It is easy to mount the two blocks on a lathe faceplate, and cut the grooves with a round-end tool. The two parts are then fitted together. By this method the tubes are bent without the slightest kinking and as fast as an operator can feed the cut pieces to the punch press. While a power press is used for this job, a hand-operated arbor press will do if the output needed is not large. The same method can be used for heavy-walled brass tubing up to ½ in. in diameter, and larger, if the bend is not too sharp, but thin-walled tubing, larger than ⅜ in., is likely to buckle.—A. E. Granville, Cleveland, Ohio.



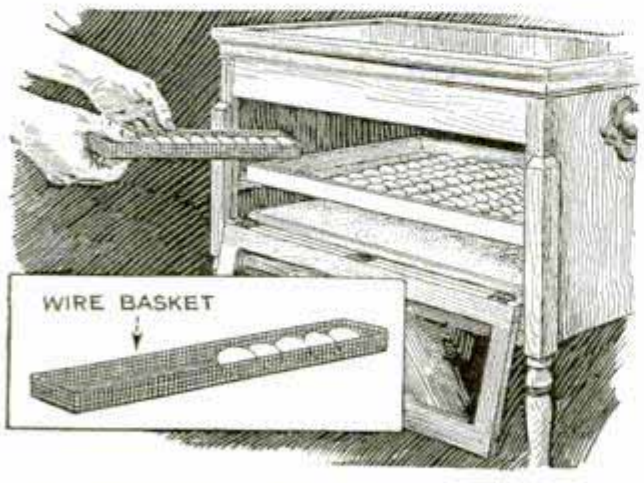
¶Several turns of tape around the middle of a pulley face will prevent a belt from working away from the center.

Maintenance of Concrete Silos

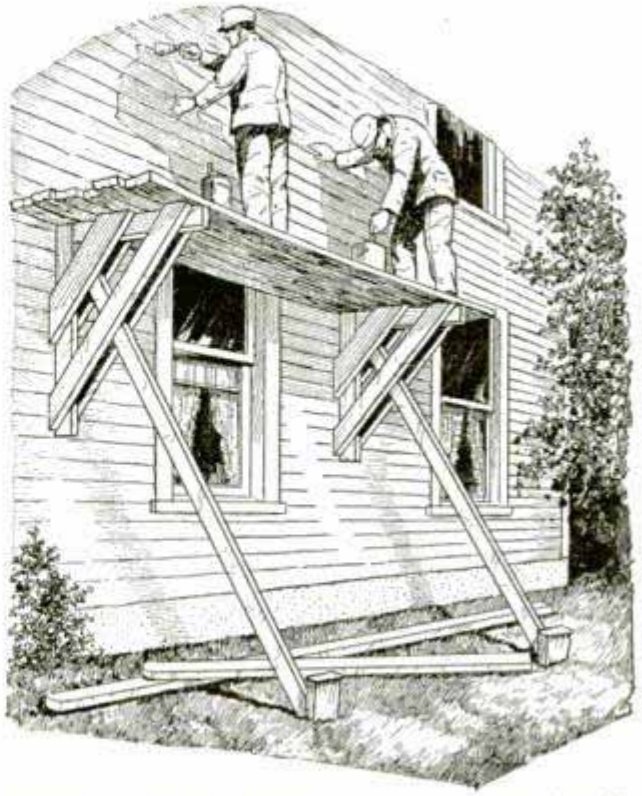
In the spring it is time to think of your silo, which, possibly, is in need of repairs. Silage juices, if not cleaned off cement walls, will continue their destructive action on the cement. Small pinholes enlarge rapidly during the hot summer days and in a short time the walls begin to crack and the silo will leak. To clean cement walls, use large-size wire brushes and hot water. It is advisable to dissolve about 1 lb. of coarse salt to each pail of water, which should be very hot. This application will kill the destructive germs of the silage juices. After drying, it is a good idea to cement-wash the walls as smooth as possible.—G. J. Issakoff, Sioux City, Iowa.

Wire Basket Helps Turn Eggs in Incubator Tray

Turning the eggs in an incubator is a rather slow and tedious task. Many poultrymen simplify and hasten the work by placing the egg tray on a convenient table and removing a row of eggs at one end so that the rest can be rolled in a mass toward that side. The turning is thus effected in a natural way and the eggs, which were removed, are replaced in the vacant end. While this method has its advantages, the removal of one row of eggs is slow and is accompanied by some danger of breakage. This can be eliminated by the use of a screen-wire basket, as shown in the illustration, one being provided for each tray. The basket is just large enough to accommodate a whole row of eggs.—G. E. Hendrickson, Argyle, Wis.



Wire Basket Holding One Row of Eggs Facilitates Egg-Turning Task in Incubators



Convenient Scaffold Which Is Portable and Adjustable to Various Heights

Adjustable Scaffold for Painters

The adjustable scaffold shown in the drawing will be found useful by painters. It consists of two right-angle brackets made of 2 by 4-in. material, two pairs of diagonal braces being nailed to each bracket to make it rigid and to permit the insertion of a 2 by 6-in. supporting plank, which in turn is prevented from slipping by means of stakes driven into the ground, as indicated. After the brackets have been set up against the side of the house, planks can be laid over them. Two or three pairs of supporting planks should be provided so that the scaffold can be set at various heights.—John Tobiason, Willis, Kans.

India Ink in Fountain Pen

India ink, used in fountain pens, dries out quickly and obstructs the flow through the feed line. This trouble can readily be remedied by plugging the small air holes in the cap. Moisten a bit of cotton batting with glycerine and push the wad into the end of the cap. After the pen has been filled with india ink, be sure to replace the cap as soon as you have finished writing, and every time you use it, or the precaution will be of no avail.—J. E. Noble, Hollyburn, Can.

Homemade Machine for Making Rope

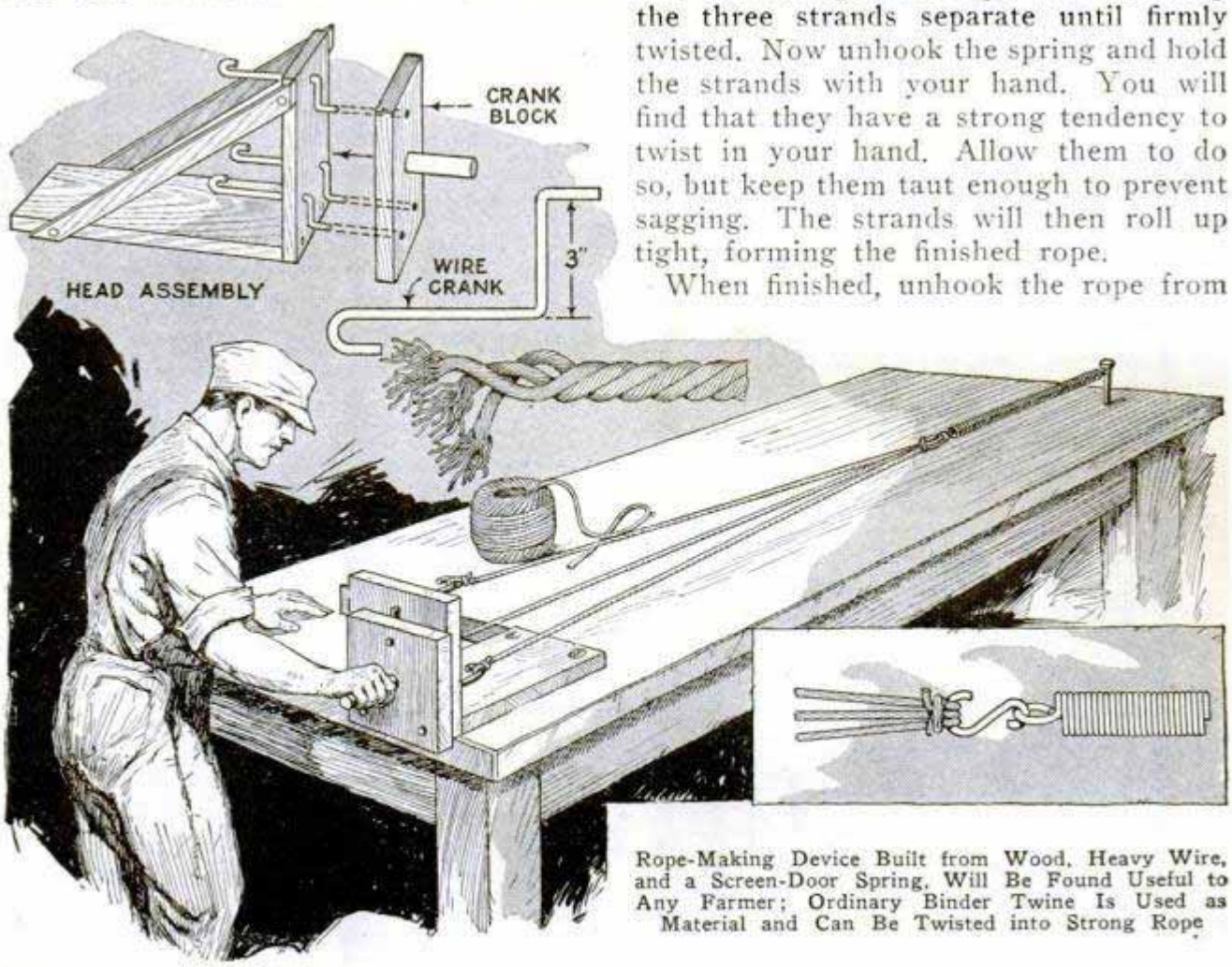
By HAROLD JACKSON

HERE is a simple machine with which you can make rope for halter ties, straw slings, etc., from ordinary binder twine. It is made from a few pieces of 6-in. wood, some wire, about 3/16 in. in diameter, and a screen-door spring. The drawing shows the construction of the parts and the assembly.

The head of the machine is made from two pieces of 6-in. wood, nailed together to form a right angle, and braced as indicated. Three ¼-in. holes are drilled in the vertical piece about 4 in. apart and in the form of a triangle. Three cranks, made of the wire and shaped as shown, are placed in the three holes. The cranks should be about 3 in. long and all exactly alike in this respect. Make the crank block next. This is another piece of wood, 6-in. square, which is fitted with a wooden handle. Three holes are drilled in it to coincide with those in the head and fit over the horizontal crank ends. When this block is moved by means of the handle, the cranks will all turn with it. The head assembly is nailed to a bench about 12 ft. long, or to the floor or hayrack, if a bench is not available.

The door spring is held by a nail driven into the bench some distance from the head. If you wish to make a halter rope that is to be 7 ft. long, fasten the spring so that there will be 8½ ft. between the head and the near end of the spring. The twisting of the strands shortens the finished length of the rope considerably. It takes 36 strands of twine, 12 on each crank hook, to make a ⅝-in. rope. This is a good size for halters. All the strands are then attached to the hook at the end of the spring. Draw the strands tight so they will not sag, and the winding will then be easy. Now turn the crank slowly. This will twist the strands separately. Twist them very tight, for the tighter they are, the stronger the rope will be. Keep the three strands separate until firmly twisted. Now unhook the spring and hold the strands with your hand. You will find that they have a strong tendency to twist in your hand. Allow them to do so, but keep them taut enough to prevent sagging. The strands will then roll up tight, forming the finished rope.

When finished, unhook the rope from



Rope-Making Device Built from Wood, Heavy Wire, and a Screen-Door Spring, Will Be Found Useful to Any Farmer; Ordinary Binder Twine Is Used as Material and Can Be Twisted into Strong Rope

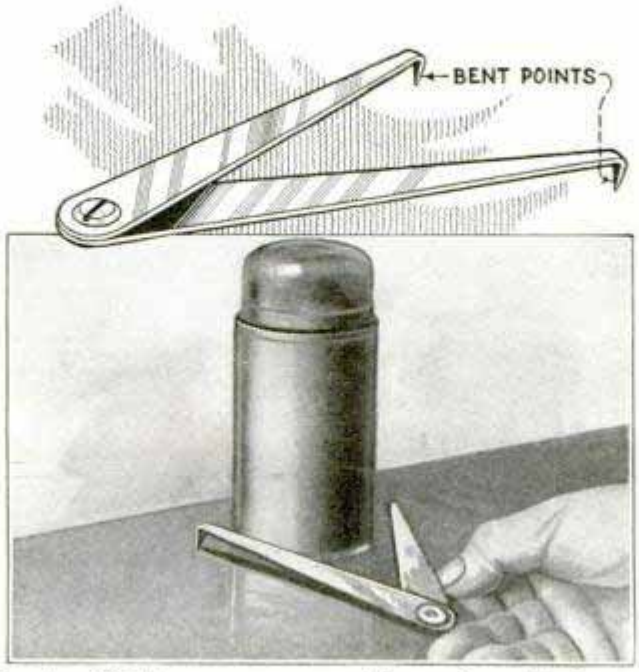
the head of the machine and it will be ready for use. If you are going to use the rope on a halter or want to put a ring or snap on one end, you can best do so by making a noose on the end. This may be done by running one end of the rope through the loops of the twine that were placed over the hooks on the machine. This forms a neat connection. A hog ring should be pinched onto the other end to prevent unraveling.

Cementing Gear-Shift-Lever Ball

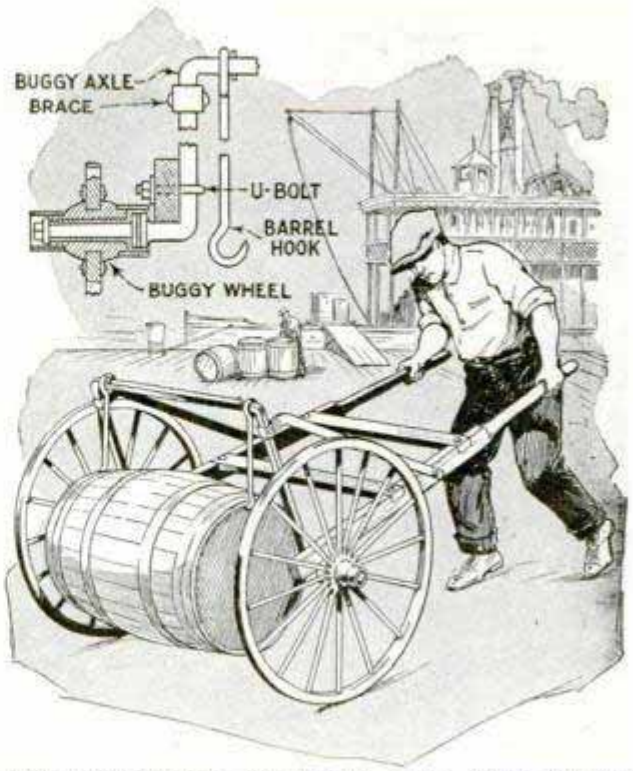
After having several beautiful onyx gear-shift-lever balls stolen, the writer hit upon the idea of cementing one on to prevent its theft. Get about 6 oz. of fresh litharge, making sure that it is reasonably fresh, as it becomes "slacked" when exposed to the air and will not set. To a teaspoonful of litharge add glycerine until the mixture reaches the consistency of a very thick cream, and apply this to the threads both on the lever and in the ball. Then screw the ball down as tightly as possible. After a day or so, it will be impossible to remove the ball by hand.—G. T. Fowler, Bakersfield, Calif.

Dividers with Bent Points for Marking Centers

Ordinary straight-pointed dividers are often unsuitable for laying off hole centers when there is an obstruction such as a boss, shoulder or other raised part between the two points. To mark off center-to-center positions under such conditions, make a pair of dividers with bent points, as shown. With these you can get around most obstructions that would interfere with the ordinary tool. These dividers are made of flat metal with a caliper joint and are used as indicated.



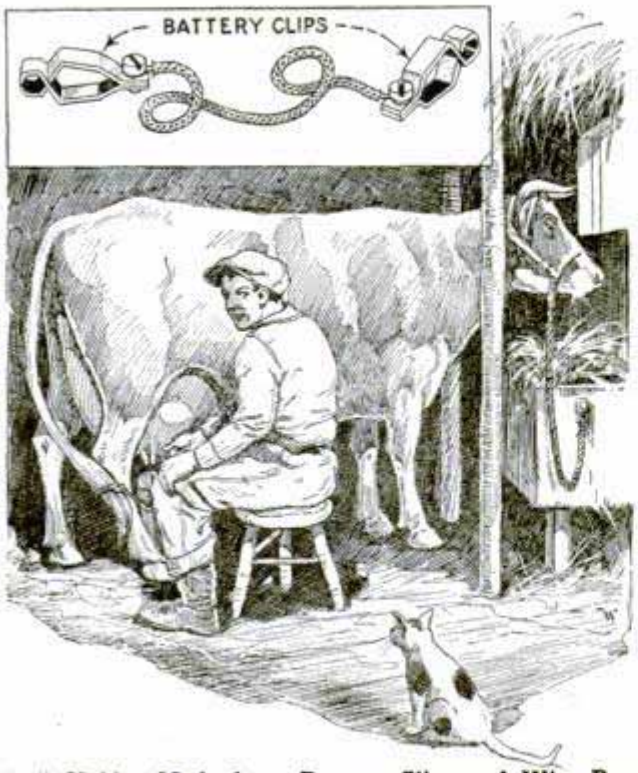
Laying Off Measurements over Obstructions with Bent-Pointed Dividers



Heavy Barrels Can Be Moved About Single-Handed by Means of This Truck

Truck for Carrying Heavy Barrels

The manager of a large oil station made a barrel-carrying truck that will prove of interest to garage and gas-station attendants generally, and also to orchardists, farmers and gardeners, as it allows one man to lift and convey a filled barrel. The truck consists of a U-shaped axle made by welding sections of two buggy axles together, and suspension hooks that engage the chines of the barrel. When the handles are pushed down to the position most convenient for moving the truck, the barrel will be raised 4 or 5 in. above the ground. Narrower trucks of similar construction can be used by ice-cream manufacturers, by making the suspension hooks shorter so that they will engage with the handles of the ice-cream tubs and hold them upright. —G. E. Hendrickson, Argyle, Wis.



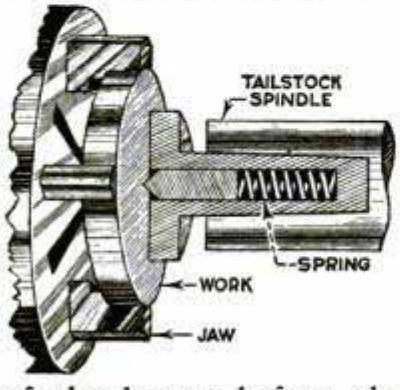
Tail Holder Made from Battery Clips and Wire Prevents Cow from Switching

Preventing the Cow from Switching

When being milked in the summer months, cows are often annoyed by flies and switch their tails to the discomfort of the milker. To avoid this trouble one dairyman provides his milkers with the tail holders shown. Each is made from a pair of battery clips, to which a length of wire is attached. In use, one clip is attached to the knee portion of the milker's trousers, and, as he seats himself to do the milking, the other clip is attached to the brush of the cow's tail.—G. E. Hendrickson, Argyle, Wis.

Spring Center for the Lathe

Many jobs that are held in the lathe chuck are first laid out in order to determine the exact location of the part to be turned, bored or drilled. The spring center shown has been found of great help in locating the central point of the layout before closing the chuck jaws upon the work. The device is first entered into the center mark of the layout, while the work is held firmly up against the flanged face of the center holder. It is then approximately in the correct position to be held in the chuck, after which the center is moved out of the way. If a more accurate setting is desired, it can be accomplished by using an indicator.—Chas. Homewood, Hollywood, Calif.



Jug Makes Good Bee Trap

Swarming wild bees often settle in very inconvenient places about the farm buildings, such as between partitions, under floors and other out-of-the way corners, where they can hardly be caught by ordinary methods. On a Wisconsin farm, a swarm collected between the lining and outside boxing of the barn, annoying both the farm folks and the live stock. At length, on the advice of a neighbor, the farmer suspended an open jug just beneath the opening in the building where the bees had entered, doing this work after nightfall. A piece of cardboard, rolled up to form a tube, was inserted several inches into the mouth of the jug. By the following evening practically the entire swarm was trapped. The secret of the trick, it is claimed, lies in the fact that in the slightest breeze, a low hum, very similar to that made by industrious bees at work inside of the hive, is produced in the open jug. The wild bees enter the jug to pilfer but cannot easily find their way out again.—D. R. Van Horn, Lincoln, Nebr.

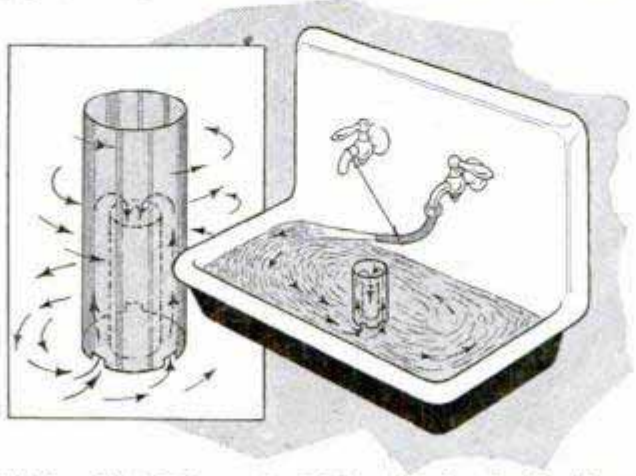
Steam-Boiling Liquids in Vats

In one workshop there are a number of large vats full of liquid, which must be kept boiling for several hours every day. The method formerly used to do this was to turn steam into each vat. As an experiment, the vats were fitted with light metal covers and just enough steam turned on

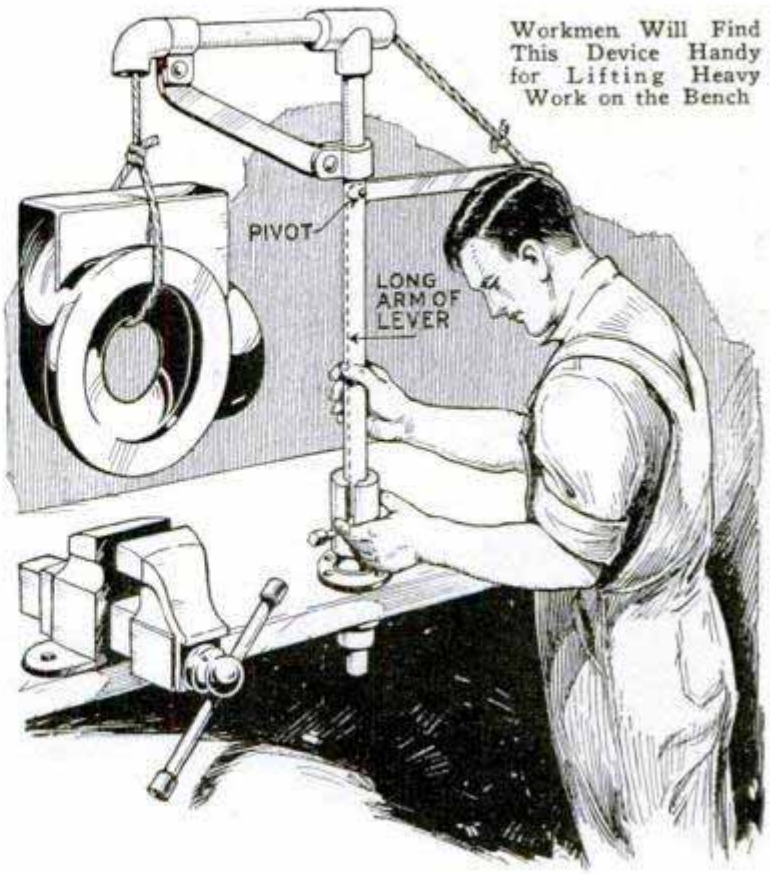
to keep the liquids boiling slowly. The result was satisfactory as it effected a saving of more than 20 per cent in steam. There are many factories where live steam is still used to boil liquids in uncovered vats. Even when exhaust steam is used in closed coils, much of the steam can be saved and used in some other way if all the vats are provided with covers, especially if the vats are located in unheated rooms during the cold season.—James E. Noble, West Vancouver, Can.

Washing Photographic Prints in the Kitchen Sink

To be efficient a photo-print washer should have two features: The water should be kept in motion and the drain should be located at the bottom so that it will carry off the hypo, which is heavier than water and hence settles at the bottom. Both of these conditions are met in an ordinary kitchen sink if arranged as shown in the illustration. All that is necessary to use is a length of hose and two short pieces of pipe. The hose is attached to the faucet and held toward one side, as indicated, by means of a cord tied to the other faucet. This makes the water rotate freely in the sink. Remove the strainer from the drain and insert one of the pieces of pipe, which should fit into the drain snugly and rise 2 or 3 in. above the bottom of the sink, depending on the depth of water maintained during the washing. The other pipe, longer and of larger diameter, is notched in the bottom edge to permit the passage of water and placed over the first, as indicated. The water at the bottom, which contains the hypo, is forced out by the pressure and the swirling motion of the whole body of water.—J. G. Pratt, Washington, D. C.



Kitchen Sink Makes a Good Print Washer for the Home Photographer Who Does His Own Work



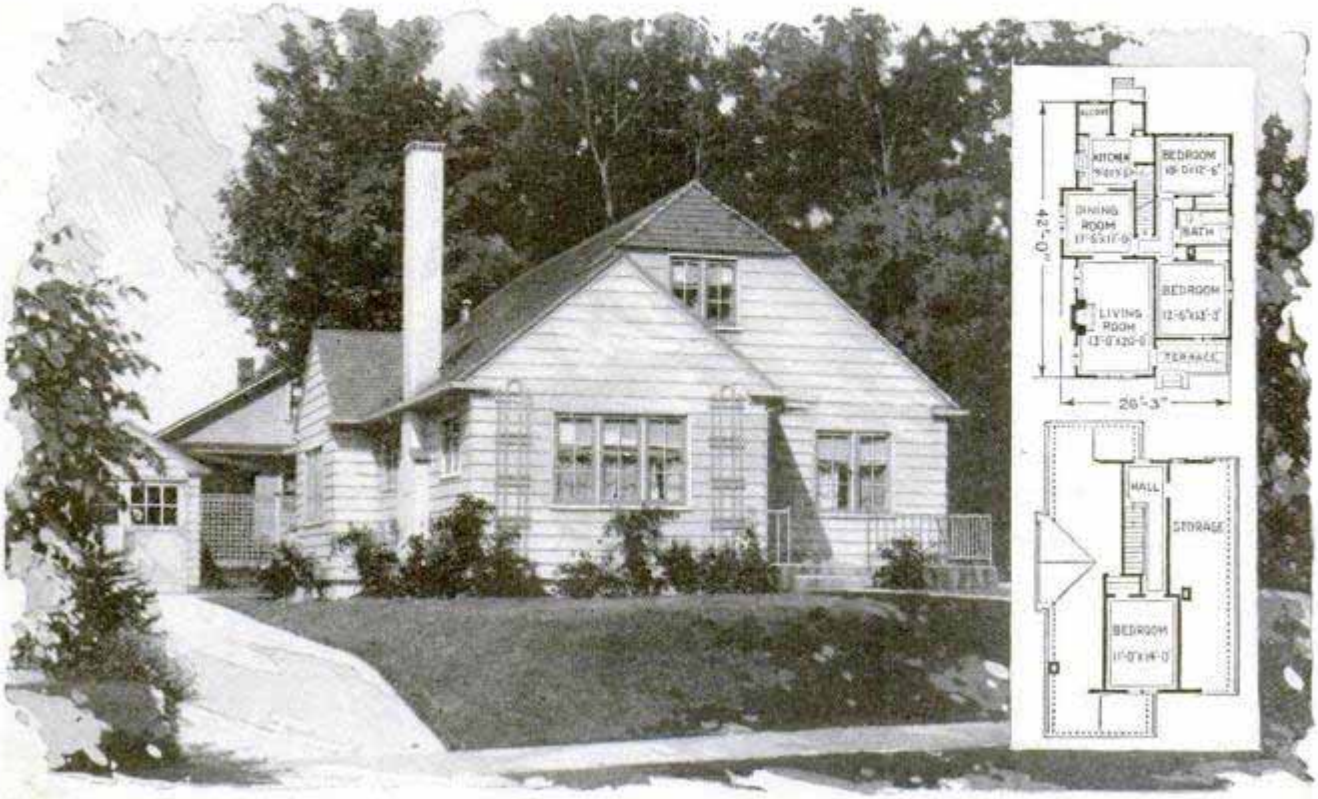
Workmen Will Find This Device Handy for Lifting Heavy Work on the Bench

Device for Lifting Heavy Work on Bench

Often it is a rather difficult task to place a heavy piece of work in a vise single-handed, especially if the work is of awkward form. To facilitate the job, a special lifting tackle will be found useful. That shown herewith was made up of pipe and fittings, a lever of flat stock, a length of wire rope and a lock collar. The method of assembly is clearly shown, and it is used in the following way: The work is first placed on the bench, or on a truck of the same height, and the rope and hook are attached. It is then lifted by means of the lever and swung over the vise. If necessary, the lever can be locked in this position by the slotted collar as indicated. After the vise jaws are opened, the work can be let down with one hand on the lever, while, with the other, the vise is tightened. When through, the device is stowed away.

374

Is This Your Home?



Copyright, the Architects' Small House Service Bureau

Plan No. 5E4

QUESTIONS regarding home building addressed to this magazine will be answered by The Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and indorsed by the United States department of commerce. Blueprints, specification forms, and material lists for the house shown here may be obtained from the Architects' Small House Service Bureau for a small fee. If further information is desired, literature describing the plan service and publications of The Architects' Small House Service Bureau will be sent you upon request. A booklet entitled "50 Ways to Lower Home Service Costs," illustrated by ten Bureau homes actually lived in and showing how as much as $1,000 can be saved on a home, may be obtained for 20c.

IF the five-room bungalow is more extensively represented among the small homes of this country than any other type, evidently there must be something supplied by the house of this type to give it such wide popularity. The principal reason for this no doubt is its economy in respect to building costs.

In this design every acknowledgement has been made to the absolute requirements of economy, and yet the house has good character from the exterior through the proper massing of walls, openings and roof. This little house has the virtue of simplicity and yet, when it is finished and set among pleasant surroundings with flowers in the window boxes and with vines upon the trellises, its attractiveness will be apparent to all.

The plan is designed expertly so as to make the most of what five rooms can bring. The living room, dining room and kitchen are arranged in order, one behind the other, with dining alcove at the rear. There is not an inch of space wasted anywhere. Each room is well ventilated, has fine large windows with space for furniture. Convenience and economy have gone hand in hand.

The attic provides not only possibilities for extension in the way of an extra bedroom, but there is plenty of space for storage, that may remain unfinished for the time being. Later on, as the family grows, a bedroom may be arranged in the attic as illustrated in the plan.

The construction is of frame with exterior finish of wide siding. Shingles or stucco could be used. A lot of approximately thirty-five feet in width would be required. This house has been designed to face south or east. If views, prevailing winds, or other conditions make it more desirable, it may be built reversed.

Your only way to get "YANKEE" Efficiency

SKILLED mechanics know that the only way to get "YANKEE" efficiency is to get "Yankee" Tools. Amateurs and handymen can profit by that knowledge . . . Safe rule always before you buy to see that "Yankee" is on the tool!

"Yankee" Spiral Ratchet Screw-drivers are the standard of the world.

To drive screws, just push the handle. The spiral does the work. Smooth! Easy! Shift to left-hand motion and you draw screws like a flash. Another touch gives you ratchet movement for occasional heavy screw-driving.

Make sure! "Yankee" Tools may be copied in looks but not in workmanship and precision. Ask your dealer for "Yankee" Tools.

No. 130-A is the "Yankee" Quick Return. Spring in handle brings it back for next stroke. Like a thing alive! Keeps blade in screw-slot. Leaves one hand free to hold work. Three bits. Price, $3.45.

No. 30-A is the standard style "Yankee" Spiral Ratchet Screw-driver, without spring in handle. Three bits. Price, $3.00.

Made also in Heavy and Light patterns.

"YANKEE" *on the tool you buy means utmost in quality, efficiency and durability.*

Write us for "Yankee" Tool Book, free. Action pictures of tools in use. Ratchet Braces. Automatic Bench Drills. Ratchet Breast, Hand and Chain Drills. Push Drills. Ratchet Tap Wrenches. Removable-base Vises. Etc.

NORTH BROS. MFG. CO.,
Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

Three sizes of bits with each tool.

Right and left spiral, right and left ratchet, and rigid adjustments.

Up or down is the same to "Yankee" No. 130-A. Just push! This spring in the handle, with the "Yankee" Spiral does the work. Great in tight places . . . one hand drives, or draws, screws.

MAKE THEM YOURSELF

Plan No. 17d

Plan No. 9d

Plan No. 16d

Just try it! It's easy

with Stanley Plans—only 10¢ each

WE never know what we can do until we try. Here are two pieces of furniture that would cost quite a bit if you bought them. But *buying* things doesn't begin to compare with the pleasure that comes from building them with *your own hands*.

There are 25 different Stanley Plans. The list is shown in the centre of this page. Each plan tells you just how to make the object, covering every step—how to select and cut the wood, how to assemble the job, how to sandpaper, paint and finish it. To do your best work you need good tools—of course! Practically every carpenter uses Stanley Tools. Manual Training classes, too. Stanley makes the most complete line.

Buy your Stanley Plans from your hardware dealer. If he cannot supply you, write to us. Send 10c for each plan and ask for a free catalog of Stanley Tools. Address Advertising Department, The Stanley Works, New Britain, Conn.

No.
1d—Book Rack
2d—Candle Stick
3d—Pipe Rack
4d—Flower Box
5d—Table Lamp
6d—Toy Automobile
7d—Sconce
8d—Dinner Gong
9d—Bird Houses
10d—Dog House
11d—Book Stand
12d—Smoking Cabinet
13d—Kitchen Cabinet
14d—Sewing Cabinet
15d—Cedar Chest
16d—End Table
17d—Tea Wagon
18d—Model Sailboat
19d—Combination Sail- and Row-boat
20d—Combination Kitchen Seat and Step Ladder
21d—Garden Seat
22d—Garden Trellises
70d—Small Tool Chest
71d—Large Tool Chest
72d—Work Bench

This book, "How to work with tools and wood," takes all the mystery out of wood working. Tells how to make useful objects, do odd jobs, and care for tools.
185 pages
150 illustrations
cloth binding
At your dealer's or direct, $1.00.

The best tools are the cheapest to use

Ask your hardware dealer

STANLEY TOOLS

The choice of most carpenters

These are the oil companies which mix and sell

ETHYL GASOLINE

— the motor fuel that knocks out that "knock" and gives high compression performance

American Oil Company
American Ethyl

Anglo-American Oil Co., Ltd.
Pratt's Ethyl Petrol

Ashland Refining Company
Red Pepper Better Ethyl

Associated Oil Company
Associated Ethyl

Atlantic Refining Company
Atlantic Ethyl

Beacon Oil Company
Colonial Ethyl

Continental Oil Company
Conoco Ethyl

Crystal Oil Refining Corp.
Crystal Ethyl

Empire Oil Works
Empire Ethyl

Humble Oil & Refining Co.
Humble Ethyl

Imperial Oil, Limited
Imperial Ethyl

Johnson Oil Refining Co.
Johnson Ethyl

Kendall Refining Company
Kendall Ethyl

Liberty Oil Company, Ltd.
Liberty Pep Ethyl

Louisiana Oil Refining Corp.
Loreco Ethyl

Mexican Petroleum Corp.
Pan-Am Ethyl

A. D. Miller Sons' Company
Miller's Ethyl

Pan American Petroleum Co.
Pan-Am Ethyl

Pennsylvania Refining Co.
Penreco Ethyl

Pennzoil Company
Pennzoil Ethyl

Refiners Oil Company
Refiners Ethyl

Root Refineries, Inc.
Red Chief Ethyl

Solar Refining Company
Solar Ethyl

Spears & Riddle Company
Fleet Wing Ethyl

Standard Oil Co. (Indiana)
Red Crown Ethyl

Standard Oil Co. (Kentucky)
Crown Ethyl

Standard Oil Co. of Louisiana
Standard Ethyl

Standard Oil Co. (Nebraska)
Red Crown Ethyl

Standard Oil Co. (New Jersey)
Standard Ethyl

Standard Oil Co. (Ohio)
Red Crown Ethyl

Sterling Oil Company
Sterling Ethyl

Texas Pacific Coal & Oil Co.
T.-P. Ethyl

Tide Water Oil Company
Tydol Ethyl

Union Oil Co. of California
Union Ethyl

Walburn Petroleum Co., Inc.
Walburn Ethyl

Waverly Oil Works Company
Waverly Ethyl

In addition there are hundreds of resellers.

ETHYL is in good company

WHY are these companies mixing ETHYL with their already good gasolines? To enable you as a car owner to get maximum efficiency from whatever car you may be driving.

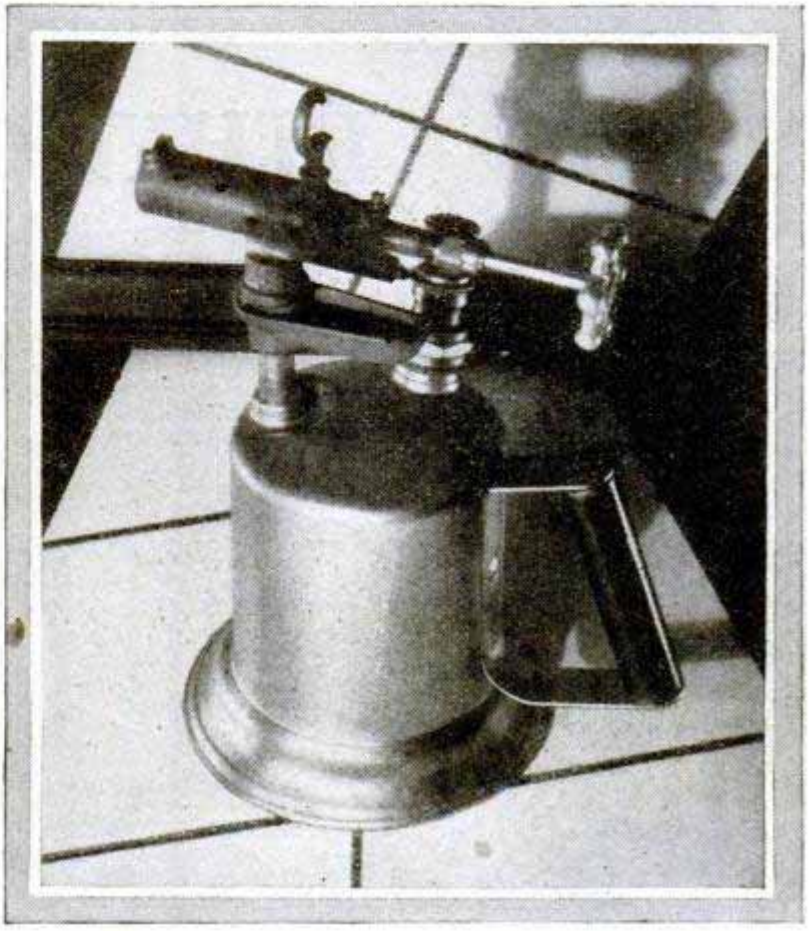
ETHYL GASOLINE CORPORATION

25 Broadway, New York City 56 Church Street, Toronto, Ont., Can.

C & L 158

This blow-torch is especially made and priced for the man who likes to do odd jobs around the house, or to tinker with mechanical things. It will last a lifetime if it is not abused. The usual retail price is about five dollars. Most hardware, electrical and automobile accessory stores have it—or can get it for you quickly. Look for the red handle.

Patented Clayton & Lambert improvements mean longer and better service



A BLOW-TORCH looks husky, and is has to do a lot of hard, rough work. But it's a pretty fine instrument, and unless it's made exactly right, any one of a number of things can put it out of commission.

Clayton & Lambert want to supply you with a blow-torch that will give you full value for your money. So we've not been satisfied merely to give you a blow-torch that does its job in fine style. We've also made it so it can stand a lot of very hard use, and still keep right on working.

Ordinarily if you strained or broke the handle you'd open the gasoline container and lose your compression. But Clayton & Lambert handles are fixed in such a way that an accident to the handle won't hurt anything else. By the way—notice the handle. It's *red*. We made it red so you could identify a Clayton & Lambert torch clean across the hardware store.

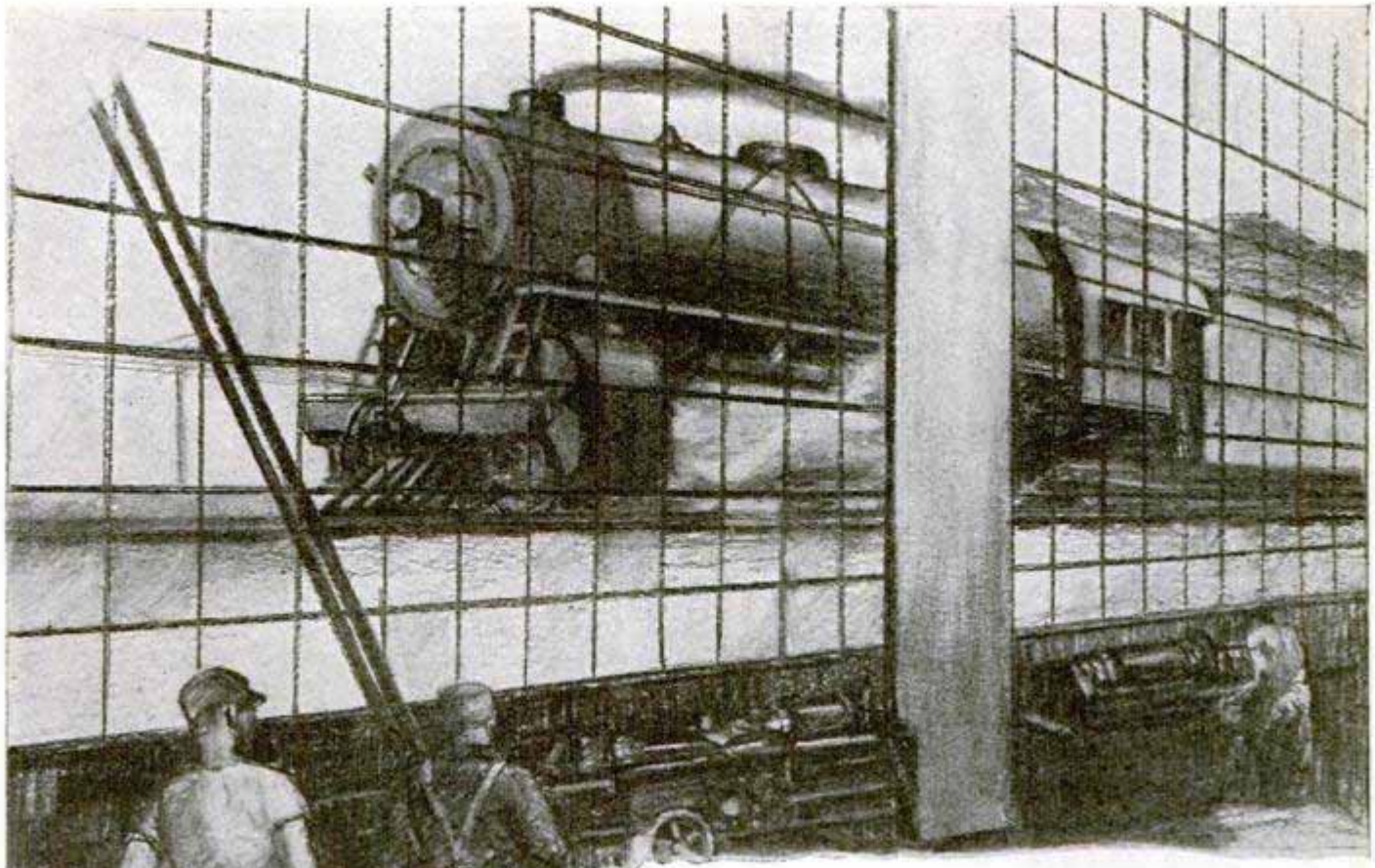
Another thing is the plug in the bottom. We've put a lead washer in there, so when you take up the screw you seal that opening tight; it can't leak. Not just when it's new. Always!

Those are just examples of improvements, many of them patented, that Clayton & Lambert has made in every part of a blow-torch. They're mighty important, for they make the difference between ordinary and excellent service. As a result, Clayton & Lambert blow-torches are the most popular in the world.

CLAYTON & LAMBERT

MANUFACTURING CO.

DETROIT, MICHIGAN



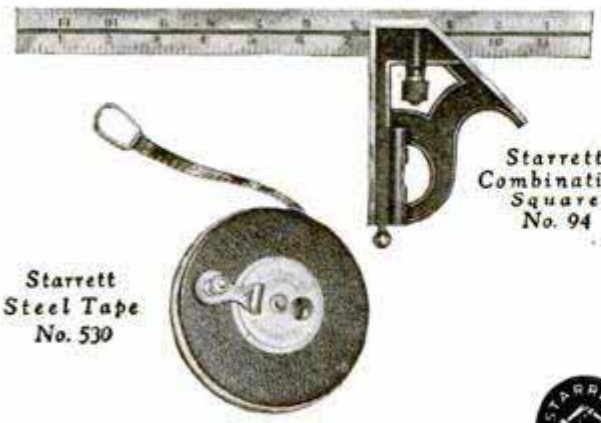
Starrett
Flexible Steel
Rule with Klip
No. 320K

Starrett's keep them moving

From Bangor to Santa Fe you'll find Starrett Tools throughout the shops, keeping those Iron Horses groomed for split minute schedules.

And you'll find them in home workshops, carpenter shops, machine shops and auto repair shops, too. The accuracy and long life of Starrett Tools make them the choice of men who know that it is poor economy to buy any but the best tools.

Your tool dealer carries Starrett Tools. Insist on the genuine. Write us for a copy of the Starrett Catalog No. 24 'AP' illustrating and describing more than 2500 Starrett Tools.



Starrett
Combination
Square
No. 94

Starrett
Steel Tape
No. 530

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS., U. S. A.

Use Starrett Tools

1898

You'd have to buy 1000 used cars

to learn what this FREE BOOK tells you!

Mail coupon below for your copy!

NOW for the first time you can get without cost a used car buyer's guide, written by experts who buy thousands of cars for resale. In 32 interesting pages and 19 pictures these men show you how to get the most for every dollar. This free book, "How to Judge a Used Car," has enabled 137,000 motorists to save time and money through the trade information it reveals. All you have to do is to sign and mail the coupon—it is yours for the asking.

"How to Judge a Used Car" tells you how to judge the condition of a car, how to learn when any car was built, what speedometers tell, what code prices mean, explains how the famous Studebaker Pledge assures you safety and satisfaction — permitting 5 days' driving trial of any car you select.

A 2c stamp will bring you facts that may easily save you $200! Send the coupon *today!*

THE STUDEBAKER CORPORATION OF AMERICA
Dept. H-72, South Bend, Ind.

Please send me my copy of your valuable free booklet, "How to Judge a Used Car."

Name.....

Street.....

City.....*State*.....

Pledge to the Public
on Used Car Sales

1 Every used car is conspicuously marked with its price in plain figures, and that price, just as the price of our new cars, is rigidly maintained.

2 All Studebaker automobiles which are sold as CERTIFIED CARS have been properly reconditioned, and carry a 30-day guarantee for replacement of defective parts and free service on adjustments.

3 Every purchaser of a used car may drive it for five days, and then, if not satisfied for any reason, turn it back and apply the money paid as a credit on the purchase of any other car in stock—new or used. (It is assumed that the car has not been damaged in the meantime.)

© 1927, The Studebaker Corporation of America

Where this Pledge is displayed by Studebaker dealers, you can buy a used car safely

STUDEBAKER

The Great Independent

BEFORE You Buy Get This NEW PLUMBING Buyer's Guide

WHOLESALE PRICES—YOU SAVE 1/3 TO 1/2

You owe it to yourself at least to *see* our offers and prices before buying elsewhere. *Largest Variety and Stock* in U. S.—we have everything you want, ready to ship promptly—over 1,000,000 pieces. Here is an example of our low prices—

BURKE POPULAR PORCELAIN ENAMEL BATHROOM OUTFIT

Suitable for any home—strictly first grade throughout—no "seconds"—all fixtures well constructed of solid brass, heavily nickel plated, highly polished—guaranteed to give lasting service, and priced lower than you would expect—

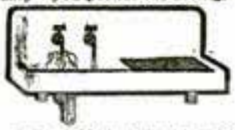
ONLY $55.75 COMPLETE

Ready to install in your home. *Quick shipment.* Mention No. 01F1.

Pipe Fittings—most complete line in U. S.—brass, cast iron, copper, lead, malleable iron. All kinds of pipe. *Parts, Accessories*—everything you need. Get our prices.

"BE YOUR OWN PLUMBER"

You or a mechanic friend or neighbor can set up and connect quickly, easily, cheaply and in a workmanlike manner this bathroom outfit or any other equipment we offer by following *our easy directions*—the ordinary plumber's services and charges are not necessary—you pocket the saving.



Beautiful, Durable Sinks—Many to choose from. Compare our prices.

GUARANTEE If for any reason this Bathroom Outfit, or any part of it, or anything else you may get from us does not please you, we will exchange it for other goods of your selection or refund your money.

Laundry Tubs—Kinds you will like. Money-saving offers.

Hot Water and Steam Heating Systems. Excellent values as you will see. Our catalog contains several pages of information helpful to you in deciding which kind of a heating system to get—steam, hot water or warm air—and useful tables of figures and other data you want.

Water Heaters for all purposes—Instantaneous type only $125.00.

Furnace Pipe and Fittings. A full line.

Tinning—Everything, in stock.

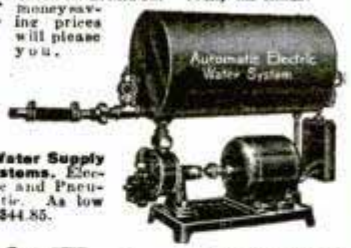
Paint and Varnish—For every purpose—for interiors and exteriors—barns, houses, walls, floors, fences.

Fencing—None better made and our money-saving prices will please you.

Steel Sheets—Plain, corrugated, rock, all kinds.

ESTIMATES FREE

Just send us a plan or rough sketch giving an idea of what you want or have in mind. Or we will send you Estimate Forms on request. Our expert engineers will work out an installation to fit your needs. You will be delighted with their recommendations and will see how greatly you benefit from this *free service* in the saving of time, labor and money.



Water Supply Systems. Electric and Pneumatic. As low $44.85.

Roll Roofing—Plain and slate coating—Shingles—Building Paper—in stock, and paper prices low.

Sewage Disposal System—none better. Sizes for all needs. As low as $20.65. Get particulars.

Warm Air Furnaces from $43.50 up. We can save you money and satisfy you completely. Only reliable makes handled. See what we offer before deciding. Costs you nothing to find out.

EASY PAYMENT PLAN

Our Warm Air Pipe and Pipeless Furnaces, Steam and Hot Water Heating Plants, Water Supply Systems, etc., may be had on Easy Payment Terms—no additional charge—some Furnaces as low as $7.50 down and $7.50 a month. Send for our catalog—see how easy we make it to own and enjoy such useful equipment. Why lay out the cash when you don't have to?

GOODS ON OPEN ACCOUNT

Anything in the catalog sold on open account if in business and rated in Dun's or Bradstreet's.

Send for FREE CATALOG

New—just out. You should have it—will help you in making your selections. Very useful as a buying guide. Free, no charge. Send for it now.

BURKE (4) BROS. Dept. 1638, 433 Liberty Ave. PITTSBURGH, PA.

FREE BOOK

For You—Just what you want. Get it before you buy. Crammed full of up-to-date offers at **Bargain Prices**—Lowest anywhere. Everything is high grade, perfect **No "Seconds"!** Our goods are of the kind that last and please all the while.

→YOU Need It

Get it—compare our quality and prices with others'—**We save you 1/3 to 1/2**—you pay no less than many plumbers pay their jobbers. **"Be Your Own Plumber"**—it's easy—**Book** tells how. **60** pages—**4000** offers and sizes—everything in

Plumbing—Heating—Tinning—Paint

Such as Bathtubs, Lavatories, Closets, Sinks, Laundry Tubs, Water Heaters, Range Boilers, Water Supply Systems, Pumps, Tanks, Pipe, Sewage Disposal Systems—Furnaces, Steam and Hot Water Heating Plants—Parts, Fittings, Tools, Accessories, Supplies—Paint, Varnishes—and on hand also Fencing, Roofing, Tinning—**anything you want**—all at **cut prices**—over 1,000,000 items—largest stock and variety in U.S. Some articles on **Easy Payments**—anything on **Open Account** if in business and rated. **Write for Free Book Today—NOW.**

BURKE (4) BROS. Dept. 1638, 433 Liberty Ave. PITTSBURGH, PA.

Write Today—NOW!

BURKE (4) BROS.,
Dept. 1638, 433 Liberty Ave., Pittsburgh, Pa.

Dear Sirs: You may send me your Catalog or Buyer's Guide, if free of charge or obligation, containing wholesale prices to consumers and useful information. I am most interested in the subjects marked or written below. (It is to your interest to indicate the subjects as it may give us a chance perhaps to send you special information):

...*Bathroom Outfit*	...*Steam Heating System*	...*Sewage Disposal System*
...*Plumbing Repair Parts*	...*Hot Water Heating System*	...*Tinning*
...*Warm Air Pipe Furnace*	...*Running Water Supply System*	...*Roofing*
...*Warm Air Pipeless Furnace*		...*Fencing*
		...*Paint*

Mention here any others .....

Mr., Mrs. or Miss

.....

Local Address

.....

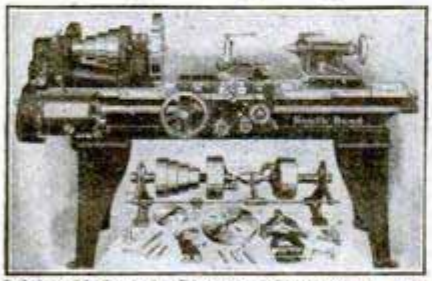
P. O. *State*

.....

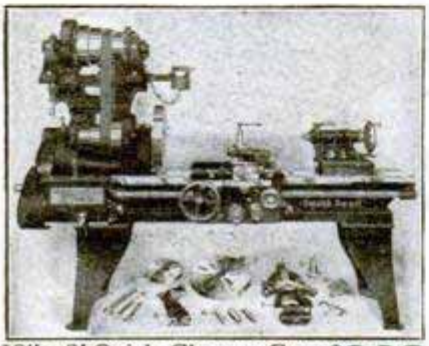
You can write anything you desire on the margin. Have you any questions?

SOUTH BEND LATHES

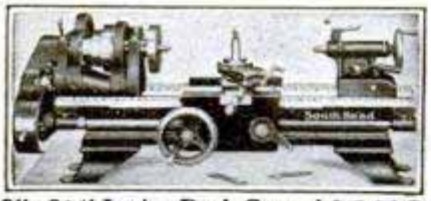
Back Geared Screw Cutting
Precision Lathes
***For* Tool Room**
Manufacturing—Machine Shop
Repair Shop
Service Station — Laboratory
Engineering Shop



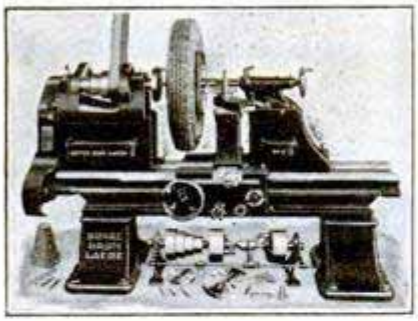
16" x 8' Quick Change Gear Lathe, Straight Bed..... **$570**



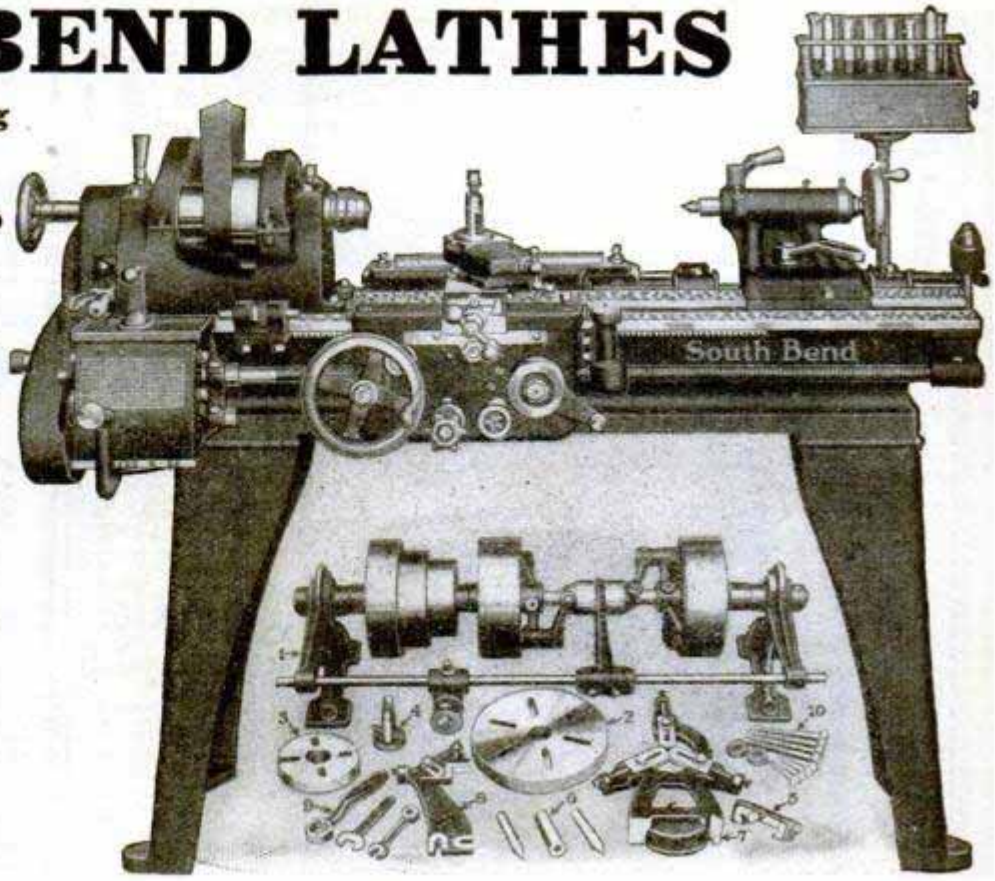
18" x 8' Quick Change Gear Motor Driven Lathe **$908**



9" x 2½' Junior Back Geared Screw Cutting Bench Lathe. **$150**



Brake Drum Lathe
Handles all Brake Drum work without removing tire or rim, up to 32" diameter..... **$475**



11" x 4' New Model Precision Tool Room Lathe with Countershaft and Regular Equipment..... **$335**

Other Popular Selling Sizes

The Prices of Popular Selling Sizes with Countershaft and Equipment

Size of Lathe	Shipping Weight	Standard Change Gear	Quick Change Gear
9" x 3'	490 lbs.	**$235.**	**$270.**
11"x 4'	725 lbs.	**$300.**	**$335.**
13"x 5'	1110 lbs.	**$352.**	**$402.**
15"x 6'	1550 lbs.	**$430.**	**$490.**
16"x 6'	1875 lbs.	**$480.**	**$540.**

Easy Payment Plan—10 Months to Pay

Small down payment, balance in 10 equal monthly payments, or you can purchase through your nearest machinery dealer.

FREE—Write for No. 89A Catalog

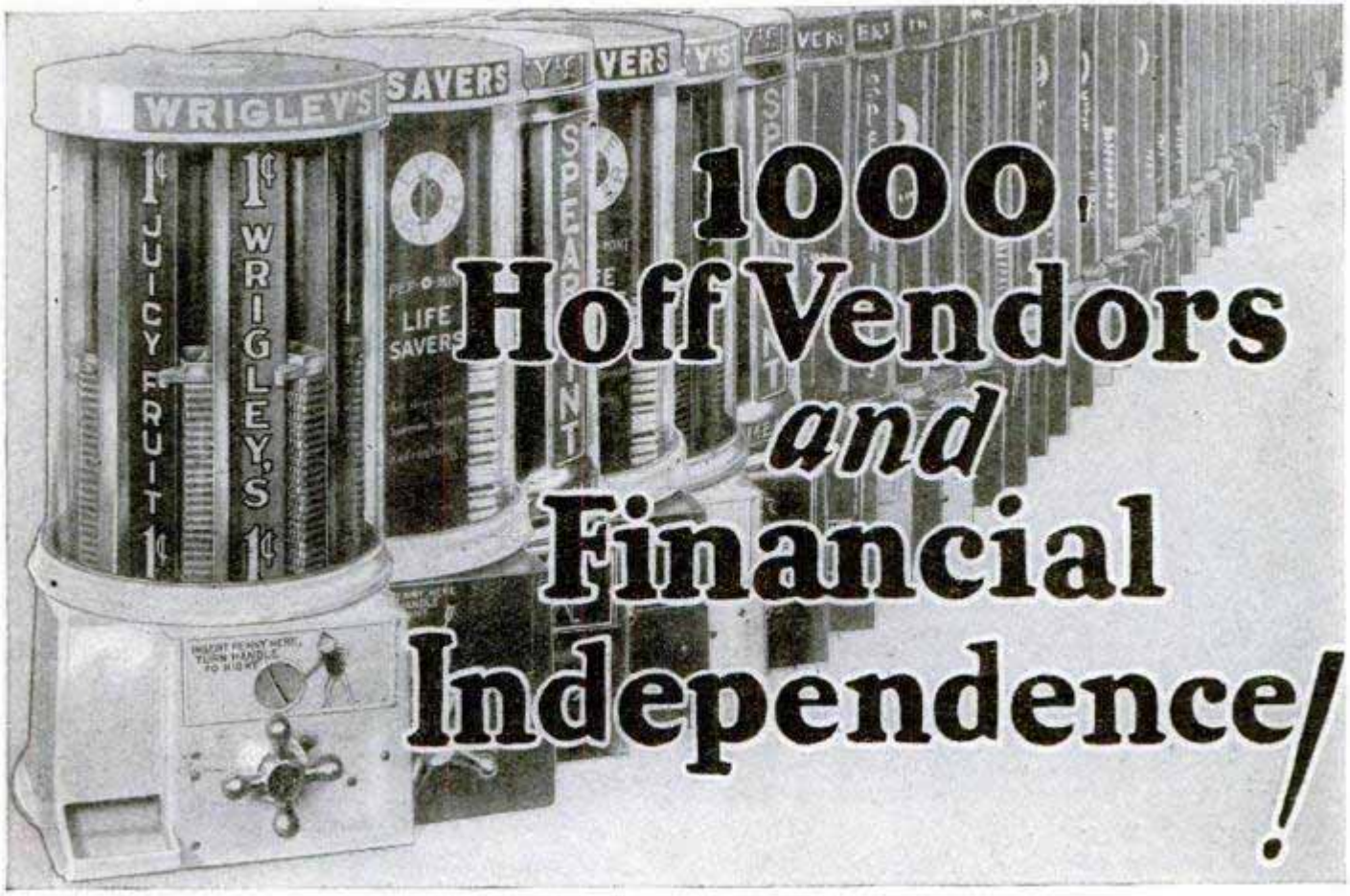
describing 210 sizes and types of NEW MODEL South Bend Lathes. Check off in the squares below, indicating the lathes in which you are interested.

- ☐ 9" Junior Lathe
- ☐ 11" Lathe
- ☐ 13" Lathe
- ☐ 16" Lathe
- ☐ 18" Lathe
- ☐ New General Catalog No. 89A
- ☐ "How to Run a Lathe," Price 25c
- ☐ Auto Mechanics Service Book, 25c
- ☐ Brake Drum Lathe Circular

SOUTH BEND LATHE WORKS
Main Office & Works, 640 E. Madison St., South Bend, Ind., U. S. A.
New York City: J. E. Beggs Co., 183 Centre Street

Carried in Stock by Machinery Supply Dealers in Principal Cities Throughout the World

ATLANTA, GA.—Fulton Supply Co., 70 Nelson St.
BALTIMORE, MD.— Carey Mach. & Supply Co., 119 E. Lombard St.
BIRMINGHAM, ALA.—Moore-Handley Hdwe Co., 21st & Ave. "A"
BOSTON, MASS.—Joseph Beal & Co., 465-71 Atlantic Ave.
CHICAGO, ILL.—Scott Bansbach Mach. Co., 130 S. Clinton St.
CINCINNATI, OHIO—The E. A. Kinsey Co., 335 Fourth St., W.
CLEVELAND, OHIO—Clark Machinery Co., 1235-45 St. Clair Ave.
DALLAS, TEX.—Huey & Philp Hardware Co., 1029 Elm St.
DENVER, COL. — Hendrie & Bolthoff Supply Co., 1621 17th St.
DETROIT, MICH.—Lee Machinery Co., 6318 E. Jefferson
HOUSTON, TEX.—Wessendorff, Nelms & Co., 317 Preston Av.
KANSAS CITY, MO.,—H. J. Brunner Mach. Sup. Co., 1512 Grand Av.
LOS ANGELES, CALIF.—Eccles & Davies Mach. Co., 320 San Pedro St.
MILWAUKEE, WISC.—Western Iron Stores Co., 145 W. Water St.
NEW ORLEANS, LA.—Oliver H. VanHorn Co. Inc., 522-534 Camp St.
NEW YORK CITY, N.Y.—J. E. Beggs Co., 183 Centre Street
OMAHA, NEB.—Interstate Mach. & Supply Co., 1006-10 Douglas St.
PHILADELPHIA, PENN. — Delta Equipment Co., 148 N. Third St.
PITTSBURGH, PENN — Somers, Fitler & Todd Co., 329 Water St.
PORTLAND, ORE.—The Portland Machinery Co., 62-4-6 First St.
PROVIDENCE, R.I.—The E. A. Eddy Mach. Co., Eddy & Clifford Sts.
ST. LOUIS, MO.—Blackman-Hill & Co., Inc., 1513 N. Broadway
ST. PAUL, MINN.—Robinson-Cary & Sands Co., 4th & Wacouta Sts.
SAN FRANCISCO, CALIF.—C. F. Bulotti Mach. Co., 829 Folsom St.
SEATTLE, WASH. — Perine Machinery Co., Inc., 209 First Ave., S.
TOLEDO, OHIO—The Kirkby Mach. & Supply Co., 20-22 St. Clair St.
MONTREAL, QUE.—Can. Fairbanks-Morse Co., 84 St. Antoine St.
TORONTO, ONT.—A. R. Williams Machinery Co., 166 Front St., W.



AN UNUSUAL BUSINESS OPPORTUNITY

OWNERS of chains of vending machines are making large profits in every section of the country. We make the famous Hoff Vending Machine, more than 30,000 of which are now in operation, and control the exclusive franchise for distributing in penny vending machines two of the world's largest selling, best advertised, and most popular confections—a famous gum and a famous candy. During 1928 alone, $7,500,000.00 will be spent to advertise them.

Steady High Earnings

Because of their enormous demand, monthly sales in vendors are steady and large. Practical chains, consisting of from 200 to 1000 vendors, which can be easily serviced by one man or woman, show net earnings of from $2,820.00 to $13,800.00 yearly.

The operation of a chain of Hoff Vendors requires no previous or special training. No waiting for customers. Earnings start the day a vendor is placed on location. It is a business that can be run right from your own home.

More Than 70 Established Chains

More than 70 individuals now have established chains of Hoff Vendors. They have been in operation for from one to ten years. There is right now an opportunity for several hundred thousand more vending machines.

If you are looking for a business of your own that is safe, profitable, and permanent, write today for full details concerning the Hoff system of penny vending. Our book entitled "1000 Hoff Vendors and Financial Independence" gives the full facts. It tells where vendors can be located, cost of machines, cost of gum and candy, average daily sales, and the permanent profits that can be yours. In back of Hoff Vendors stands a five million dollar corporation ready to give you every possible assistance with your chain of vendors. Write for the book today. Just use the coupon.

HOFF VENDING CORPORATION OF AMERICA
Division of General Vending Corporation
Dept. 12, 200 Hudson Street, New York City
Hoff Vendors awarded gold medal Philadelphia Sesqui Centennial Exposition, 1926

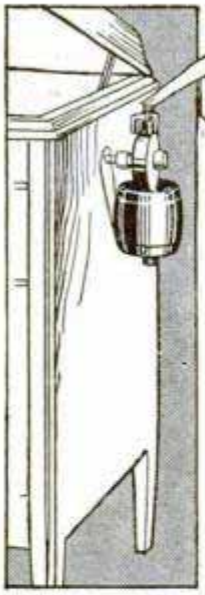
HOFF VENDING CORPORATION OF AMERICA
Dept. 12, 200 Hudson Street, New York, N. Y.

Please send your book "1000 Hoff Vendors and Financial Independence" to the undersigned. I am looking for an unusual business opportunity.

Name.....

Address.....

.....



Your old phonograph—with Motrola and electric pick-up to your radio—gives same results as the costly new electric machines.

Press the button and let the MOTROLA wind your phonograph

The Motrola is a small electric motor that replaces the winding crank on your phonograph. Readily attached to outside without marring the woodwork or affecting the mechanism. Merely press the button and the Motrola winds your phonograph more quickly and evenly than you can crank it. Stops *automatically* when spring reaches proper tension.

Quickly, easily applied

Anyone can apply or detach the Motrola in a few minutes, using only a screw driver. Winds any make or size machine. No parts to wear out—costs only a cent a month for electricity. Attractively finished, equipped with light socket plug and 10 feet of cord. Sold with our unqualified guarantee. Thousands now giving dependable, labor saving service. Ask your dealer for demonstration.

Write us today for illustrated descriptive folder

JONES-MOTROLA SALES CO.
370 Gerard Avenue New York City

SPEED — LUXURY — LOW COST

The Super Elto Quad 4 Cylinder Outboard Motor

FINEST runabout performance is now yours at a fraction of usual costs! The Quad, sensational 4-cylinder portable outboard motor drives big, comfortable boats 25 miles an hour. Instant starting, utterly vibrationless, absolutely dependable. Drives racing craft at 35 miles and better. Send for book on Super Elto motors, also complete directory of outboard boats and builders.

ELTO OUTBOARD MOTOR COMPANY
Ole Evinrude, President
Mason Street Dept. AA, Milwaukee

CASH IN!

Here's the chance of a lifetime! Get in line to sell the wonderful time proven Radio non-electric vacuum cleaner now made available at an astonishingly new low price—lower by far than ever before quoted. Unquestionably the greatest vacuum cleaner value on the market today! Beautiful one-piece cast aluminum body highly polished; smooth running rubber-tired drive wheels—efficient reversing double action bristle brush, remarkable suction—powerful ball bearing silent running fan, sealed gear case guaranteed for *five years*!

More than one million Radio non-electric vacuum cleaners now in use throughout the world. Approved by Good Housekeeping Institute. Literally sells on sight. Fast replacing the carpet sweeper. A two minute demonstration tells the whole story. No high pressure selling methods are needed. Extremely low price puts it within the reach of every home.

Don't pass up this wonderful opportunity to connect with a real money making proposition. Splendid returns to wide awake agents. Write us promptly for further details. The time to act is *now*.

THE STANDARD VACUUM CLEANER MANUFACTURING COMPANY
1920 West 115th Street Cleveland, Ohio

Beautiful HOUSES and BUNGALOWS $900 CAN BE BUILT FOR AND UP

This and many others in my new book, Building Plans for Modern Homes, will save you hundreds of dollars. One of the most complete and comprehensive books of plans ever published by any architect. New edition just off the press. Nearly 600 floor plans and photographs of Colonial houses, bungalows, etc., costing from $200 up; gives sizes and cost to build. Sent postpaid for $3.00.

FREDERICK H. GOWING
ARCHITECT
101 Tremont St., BOSTON, MASS.

GLIDERS RACING TYPE 10c 3 for 25c — AIRPLANES —

FREE Catalog with each glider order Showing Ready to Fly Model Airplanes—Construction Outfits and Supplies—Order To-day.

CLINTON TOY CO.
DEPT. 1A NORTH HAVEN, CONN.

NOW! You Can Do Your Own NICKEL-PLATING

For Plating Nickel, Brass, Copper, Silver, Gold, etc.

Make $150 to $500 a Week

New Scientific Invention Enables Anyone
To Nickel-Plate Anywhere with Aladdin Portable Outfit

This marvelous Invention enables anyone to NICKEL-PLATE anything—anywhere; in the Home, Garage, Office, Store or Shop—in fact, you can do all the NICKEL-PLATING on any automobile with the ALADDIN ELECTRO PORTABLE OUTFIT in a very short time—without removing any of the parts. This interests every auto owner (and others) because you can **SEE THE NICKEL FLOW** NOW take the Plater to the job instead of taking the job to the Plater. This offers wonderful ECONOMY to users and BIG MONEY-MAKING possibilities to AGENTS. Be the first in your locality. *WRITE FOR FREE BOOKLET.*

Introductory Offer $6.50 Plus Postage

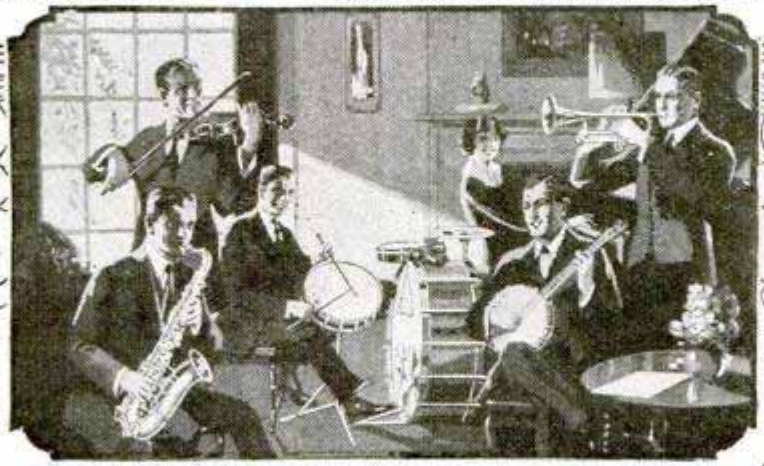
P. J. F. BATENBURG Dept. 34 RracINE, WISCONSIN

—AGENTS— WANTED EVERYWHERE

TRADE MARK REG.

WURLITZER

SUPREMACY IN MUSICAL INSTRUMENTS



Learn to Play

You are always popular and sure of a good time if you can play some musical instrument. By yourself, with your friends around the piano, in orchestras or bands,—there is no end to the pleasure music will give you. And there is no easier way to earn money in your spare time. Choose your instrument now and let Wurlitzer help you buy it and learn to play it.

Try Any Instrument in Your Own Home

At Our Expense

You may now have any known musical instrument for an ample free trial in your own home. There is no obligation to buy—no expense for the trial. You may return the instrument to us if you decide not to keep it.

Monthly Payments

The Wurlitzer plan makes it easy for you to own the instrument you want. Payments are conveniently arranged in small monthly sums — a few cents a day will pay.

Wurlitzer instruments are known everywhere for their unusual tone quality and excellence of workmanship. They are used by the greatest professional musicians, bands and orchestras. Harry L. Jacobs of Sousa's Band, Brooke's Marine Band, and Chicago Grand Opera says: "I am proud to be the owner of one of your new cornets. It is positively superior to anything I have had in all my years of cornet playing."

Easy to Buy

Thousands of amateur musicians are playing on Wurlitzer instruments. Many of them could not have bought except through the Wurlitzer selling plan. Wurlitzer is the world's greatest music house, with stores and dealers in all parts of the country. But no matter where you live you will receive the same service by mail as though you lived next door to the factory. Send the coupon today.

Send for Free Catalog

The greatest musical catalog ever published. Over 3,000 articles—every known instrument described and illustrated—many of them shown in full color. Gives you all details of the Wurlitzer plan. Send coupon now.

The Rudolph Wurlitzer Co.
Dept. C 177, 117 E. 4th St., Cincinnati

Send me absolutely free, your new illustrated catalog of musical instruments. Also tell me how I may try any instrument in my own home at your expense and how the Wurlitzer plan makes it easy for me to buy. No obligation.

Name_____

Address_____

City_____ State_____

Instrument_____
(State instrument in which you are interested.)

Copyright 1928, The Rudolph Wurlitzer Co.

AMERTRAN DE LUXE

First Stage turn ratio 3
Second Stage turn ratio 4
$10.00 Each

Standard of Excellence in Audio Amplification

AmerTran De Luxe Transformers are but two of more than 30 quality Radio Products bearing the name AmerTran, including power transformers, choke coils, push-pull systems and allied products. Each AmerTran device is designed for a specific use. Full and authoritative information will be given on any audio or power problem.

AMERICAN TRANSFORMER COMPANY
Transformer Manufacturers for 28 Years
250 Emmet St., Newark, N. J.

THE LITTLE WONDER CHECK PROTECTOR

Absolutely prevents the fraudulent manipulation of checks. Equal and in many cases superior to check protectors costing from $20.00 to $100.00. Our 5 year unconditional guarantee goes with every Protector. Beautiful in appearance, perfect in construction, designed to be carried on your fountain pen, check book, or in your pocket just where you need it when you write a check. Three hundred and fifty million dollars lost each year through fraudulent manipulating of checks. Can you take a chance when you can protect your checks against fraud the rest of your life for only $1.00. The price of a few cigars or a cheap box of candy. Write your name and address plainly and enclose your dollar and receive the most unique and perfect check protector in existence.

AGENTS SECURE YOUR TERRITORY

LITTLE WONDER CO., ALTON, ILL.

HONES AS WELL AS STROPS

Only $2.50

Two Machines in One

BARBERS' OLD RELIABLE PRINCIPLE
ZOWIE HONE-STROPPER

is the only device for sharpening safety blades that gives *entire* sharpening principle of barbers. Shaving comforts incomparable. Fits all blades except Durham. Guaranteed 10 years.

30 DAY FREE TRIAL — We Pay Postage

You be the judge. Use it 30 days; then if you care to part with it return it for full refund. Send only $2.50 now, as full payment. Sent C. O. D. if desired. **AGENTS WANTED.**

ZOWIE MFG. CO., Dept. D, 2014 E. 105th St., CLEVELAND, OHIO

Thompson BEATS the World on BOATS

BETTER BOATS at Lower Prices

The BEST that Skill and Experience can Produce

TWO BIG FACTORIES

Our complete line of 22 models offers you a variety to choose from. Prompt shipment from factory to you.

Catalog Free—Save Money—Order by Mail

Please state kind of boat in which you are interested.

213 Ann St., PESHTIGO, WISCONSIN — THOMPSON BROS. BOAT MFG. CO. (20) — 113 Elm St., CORTLAND, NEW YORK
(*Write to either place*)

--in a hacksaw built for punishment

Now . . . an all-steel, unbreakable hacksaw with perfect balance! A "feel" and a "hang" that invites action. Handle pressed from heavy steel. Pistol grip shape. Securely riveted to frame.

The tough steel frame has unusual strength where working strain is centered and is quickly adjusted for all blades 8 to 12 inches. Set in any position it provides a taut, fast, clean-cutting tool.

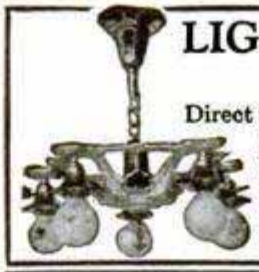
The No. 1047 shown above retails for $1.25. Other saws, with wood, steel and composition handles, range from 60c to $1.25. Every saw is accompanied by a high grade, tungsten alloy blade, and fully guaranteed.

CRESCENT TOOL COMPANY

210 Harrison St. Jamestown, N. Y.

The Crescent-Smith & Hemenway line includes wrenches, pliers, screw drivers, snips, hacksaws, auger bits, punches and chisels, etc. A copy of the complete catalog will be mailed free on request. Get yours today.

CRESCENT and Smith & Hemenway TOOLS



LIGHTING FIXTURES

Ready to hang

Direct from the manufacturer. Completely wired, including glassware. Send for new catalogue No. 29. Just Reduced Prices. *Special Proposition to Dealers.*

Erie Fixture Supply Company, Inc.
Station A ERIE, PA.

AGENTS AND SIGN MEN

Now Making $50.00 to $100.00 and Up Per Week Selling Our GOLD LEAF SIGN LETTERS

R

For store and office windows, board signs, trucks and glass signs. We also make to order script signs and business emblems singly or by the thousands. A permanent business. **No capital or experience required. Big demand in every city.** *Samples and Literature Free.*

CONSOLIDATED SIGN LETTER CO. 71-X W. Van Buren CHICAGO, ILL.

---

6 TUBE SUPERPHONIC RADIO—$16.95
FREE—6 tubes, tested and matched.

An amazing value that can't be beat! Latest 6 tube tuned radio frequency circuit. Metal chassis, shielded. Extremely selective. Long distance reception. Send for complete descriptive circular. Value $60.00, our price $16.95. Write today.

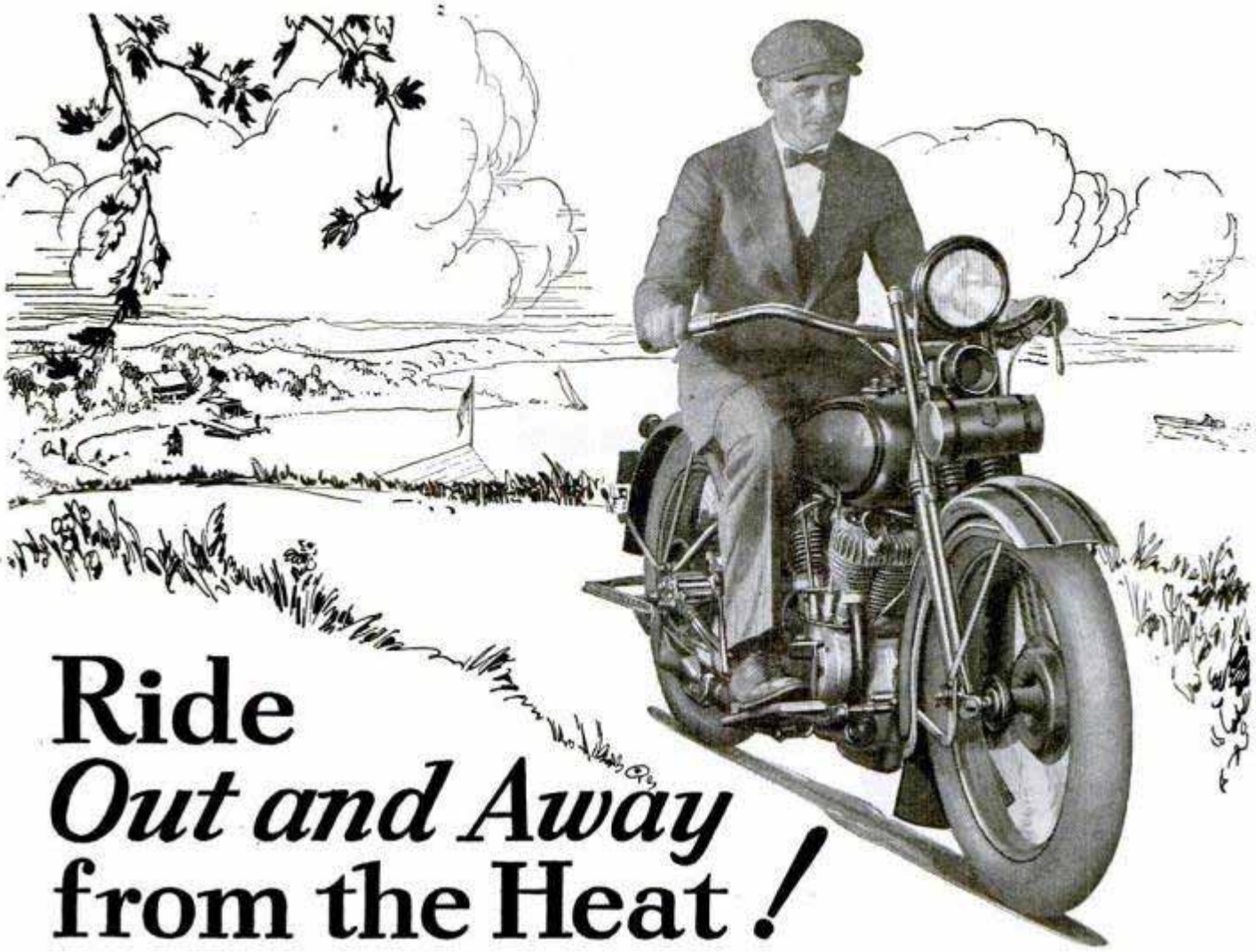
RADIO EQUIPMENT CO., DEPT. 10-H, 549 S. WELLS ST., CHICAGO, ILL.

$244.00 PROFIT *One day!*

R. W. Helmer reports this from Minnesota on **Trippe Auto Reflectors.** Wonderful device—100% more light and no glare! Pocket big money waiting for you now. Whirlwind seller, makes astounding demonstration—low cost—agents cleaning up—300% profit—big repeater—sells on sight. Over 300 sets sold in one town of 2,000 people. GET YOUR FREE SAMPLE OFFER TODAY—Wire or write.

38,000 CANDLEPOWER NO GLARE!

AERIAL ELECTRIC CO.
339 W. Ohio St.
CHICAGO



Ride *Out and Away* from the Heat!

Hot sidewalks, and smoky, noisy streets—leave them all behind you. Ride out where breezes blow and lakes are cool. "Go places!"

The Harley-Davidson is bringing new joy and health and sport to thousands. It will crowd your after-work hours, week-ends and vacations with happy thrills, and help you get more fun out of life all year 'round.

Motoring is a sport that everyone can afford — *2¢ per mile pays all expenses.* You can buy a Harley-Davidson Twin for $310 f. o. b. factory — and your dealer has an easy Pay-As-You-Ride Plan.

Ask him today for a demonstration, and mail the coupon for our catalog.

The Single—famous Harley-Davidson solo mount that travels 80 miles on one gallon of gas. Priced at $235 complete, f. o. b. factory.

HARLEY-DAVIDSON MOTOR COMPANY
DEPARTMENT P MILWAUKEE, WIS.

HARLEY-DAVIDSON *Motorcycles*

HARLEY-DAVIDSON MOTOR CO.,
Dept. P, Milwaukee, Wis.

Interested in ☐ Twin ☐ Single. Send catalog and complete details.

Name.....

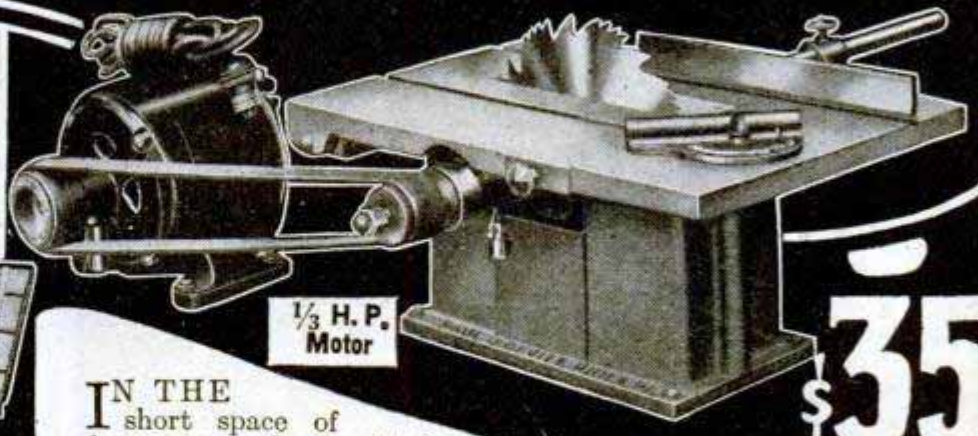
Street.....

City.....State.....

DEVITT 8" COMBINATION SAW

8,000 IN USE!

A SHOPFUL OF TOOLS WITHIN ARMS REACH!



SAW TABLE RAISED SHOWING EMERY WHEEL, SAW GUARD AND DRILL ATTACHMENT

PLANER ATTACHMENT ON SAW TABLE

SHOWING SANDING DISC ATTACHED

TABLE TILTED FOR BEVELING

DADO HEAD ATTACHED FOR GROOVING

$35 F.O.B. PHILA

IN THE short space of four years, the Devitt 8-Inch Combination Saw has become a practical necessity in thousands of shops, factories and households everywhere. Many imitators have sprung up, but Devitt leads them all. Think of the convenience and economy of this handy little machine that will rip, cross cut, bevel, miter, groove, mortise, tenon, drill, rabbet, grind, buff and polish. Attachments are easily and quicky adjusted. The saw and motor, when set up for work, occupy very little room. Saw is equipped with ⅓ H.P. 60 cycle, 1750 R. P. M. 110-volt A. C. Motor which can be attached to ordinary light socket, and provide power for other purposes when wanted. A cut up to 2¼" can be made without planing. Comes complete with following attachments—12"x16" table, 8" Combination Saw, iron pulley for saw table, 10" ripping fence, adjustable cut off miter gauge, motor-specifications as above, 1¼" endless leather belt, wood pulley, 8 ft. cord and plug, 6" buffing wheel, ⅜" 3 jaw drill chuck, 5" emery wheel, 6" sander, saw guard, and 2" dado insert. $35.00 F. O. B. Phila. Height 7½", shipping weight, 100 lbs.

(Only $12 extra for Planer Attachment to fit on table top. Can smooth pieces up to 2 inches wide. Price, F. O. B. Phila.)

Send today for our attractively illustrated 4-page circular

PAUL J. DEVITT

Dept. J 1102 SOUTH 2ND ST. PHILA., PA.

SQUAB BOOK FREE

Breed squabs and make money. Sold by millions for more than chickens. Write at once for free 40-page book beautifully printed in colors telling how to do it. *You will be surprised.*

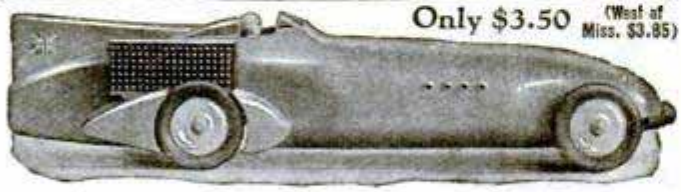
PLYMOUTH ROCK SQUAB CO.
634 H Street Melrose Highlands, Mass.

FOY'S BIG BOOK, in Colors

A complete guide to successful Poultry and Squab Raising. Low prices on CHICKS, Breeding Stock and PIGEONS.

Write Today! FREE!

FRANK FOY, Box 18, Clinton, Iowa



Only $3.50 (West of Miss. $3.85)

This Is It! The Famous "Blue Bird"

The record-making car that ran **207 miles an hour,** down in Florida. Capt. Campbell's famous "Blue Bird" now copied toy size, 19 in. long. The same slim blue body, rubber Dunlop tires, side radiators, exhaust pipes, rudder-like tailpiece, etc. And a powerful clock-spring racing motor. Rubber bumper to protect furniture. All steel, electric-welded into one rigid piece. If your dealer hasn't it, order direct. Kingsbury Mfg. Co., 83-H Myrtle St., Keene, N. H.

KINGSBURY MOTOR DRIVEN TOYS

Send 10c for Kingsbury Disc wheel Eraser. Toy Catalog Free!

MOTORCYCLES

Price $10 and up purchased through our Co-Operative Plan for as low as $1.00 down and $1.00 per week

Indians Harley-Davidsons Ace Henderson and Clevelands

Send ten cents for Bulletin A.

Motorcycles shipped to all parts of the world

WALKER-INDIAN CO., 78 Brookline Ave., BOSTON

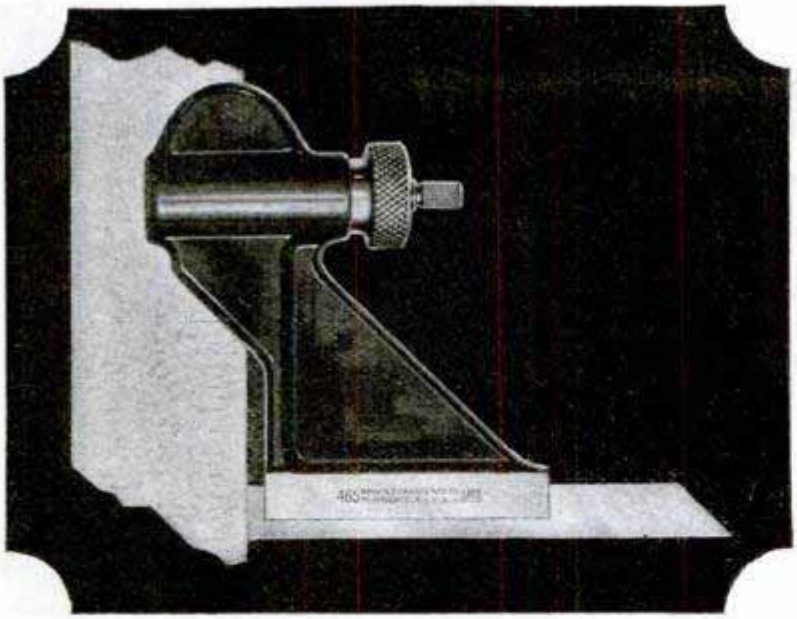
Increase Your Profits

Better more dependable air service than the other fellow is the best business builder and advertisement your shop can have, if you sell to the car owner.

Only $12 Monthly

pays for the dependable HB Automatic Air Compressor that is making large profits for its users—priced $75 to $100 less than similar equipment. 30 days trial, in your shop on absolute money back guarantee. Write for details.

Hobart Bros. Co., Box M881, Troy, Ohio.



The illustration shows the new Brown & Sharpe Height Gauge Attachment for use on Brown & Sharpe Combination Squares and Sets. No. 465A is for 9" blades; No. 465B for 12", 18" or 24" blades

With Attachment No. 465 Your Combination Square Becomes A Useful Height Gauge

You will greatly broaden the range of usefulness of your Combination Square by using this new attachment. It will then serve as a handy device for making comparative measurements, finding heights or projections from plane surfaces and for the many other uses of a height gauge.

The attachment is reversible and can be used on either side of the blade at all positions from the extreme top to the bottom. Every mechanic, carpenter or home workshop man who owns a Brown & Sharpe Combination Square can have a useful height gauge by purchasing this new attachment.

Your dealer will show you this useful new attachment. Ask him also for a free copy of Catalog No. 30 listing over 5,000 items. If he cannot supply you, write direct to: Dept. P. M., Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

BROWN & SHARPE TOOLS

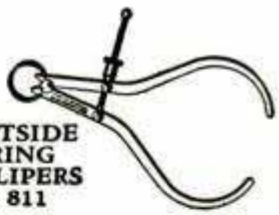
* PLANER AND SHAPER GAUGE No. 625

* STAINLESS STEEL RULE No. 350

* THICKNESS GAUGE No. 648

* DIE MAKERS' SQUARE No. 552

* COMBINATION SET No. 438



* OUTSIDE SPRING CALIPERS No. 811

* SCREW PITCH GAUGE No. 630

* ADJUSTABLE SQUARE No. 554

** A description of this tool appears in Catalog No. 30*

"WORLD'S STANDARD OF ACCURACY"

New Model Pocket Ben
$1.50

The Westclox watch

THERE'S more precision in the workmanship, more reliability in service and more good looks in the design of the new model Pocket Ben than you'd ever expect in a $1.50 watch.

Built by the makers of Big Ben and other Westclox. Sold everywhere.

WESTERN CLOCK COMPANY
La Salle, Illinois

New Westclox Auto Clock

Attractive, convenient, reliable. Fits any car. Quickly attached on dash or above wind-shield

$2.50

Handy a Super Sander

TAKE-ABOUT Sander

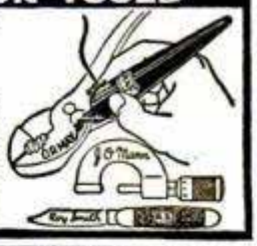
Eliminates much hand scraping, planing and sanding. Attachment allows sanding butt ends of floor with the grain right up to the baseboard.

A larger edition of the popular Take-About Sander. Same usefulness but more power; a wider belt giving greater sanding surface. Just the machine to sand floor edges, nooks, stairs, and refinish furniture. A handy machine tool that sands ten times faster than by hand. Quick belt change. Works from light socket. Easy to operate. Will soon pay for itself.

Write for details.

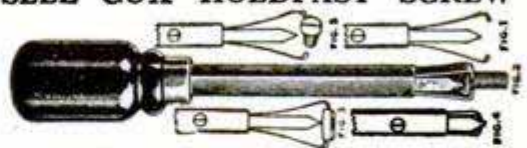
Porter-Cable Machine Co.
1704-10N. Salina St.
Syracuse, N. Y.

BURN YOUR NAME ON TOOLS
WITH THE
ARKOGRAF



PROTECT YOUR TOOLS FROM THEFT
Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil.
Complete Outfit $3.50—Prepaid Anywhere
Interesting illustrated circular free. Write today. Agents wanted.
ARKOGRAF PEN CO., 1171 E. Stark St., Portland, Oregon

SALESMEN! $100 WEEKLY
SELL COX HOLDFAST SCREW DRIVERS



Also made to use in Yankee or Ratchet Handle. Sells on sight to Garages, Radio Men, etc. Self Holding, Self Releasing. Sample and Proposition, 50c. **S. J. COX, Dept. F, Franklin, Pa.**

WITTE Engines

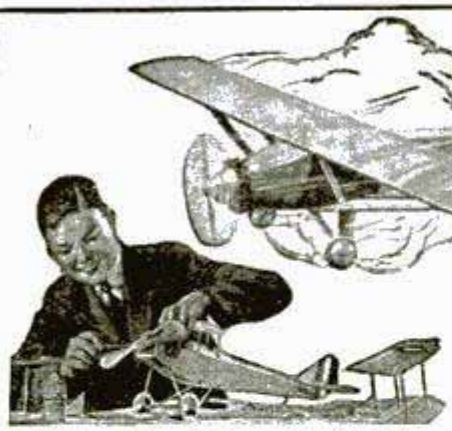
Buy Direct from Factory—Low Cash or Term Prices—Save $15 to $200. New Features—includes WITTE all-fuel carburetor and Automatic Throttling Governor. Engine runs on low grade fuels, or Gasoline—Smooth as electric motor. Easy Starting. FREE Catalog—2 to 30 HP.

Witte Engine Works 174C Oakland Ave., Kansas City, Mo.
174C Liberty St., Pittsburgh, Pa.

RAISE BELGIAN HARES

NEW ZEALAND REDS—Chinchillas—Flemish Giants
MAKE BIG MONEY—We supply stock and pay you
following prices for all you raise: Belgian Hares $2 each—New Zealands $3 each—Chinchillas $4 each—Flemish Giants $5 each. 32-page illustrated book, catalog and contract, also copy of Fur Farming magazine, tells how to raise skunk, mink, fox, etc., for big profits, all for 10c. Address

OUTDOOR ENTERPRISE CO., Box 25, Holmes Park, Mo.



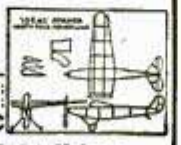
Build This IDEAL Flying Model of the

"Spirit of St. Louis"

A perfect 3-foot miniature of the most famous Airplane in the world! Anybody can build and fly it. The IDEAL Complete Construction Outfit contains everything needed: all parts, fittings and materials, full plans, diagrams and instructions. The Model is guaranteed to fly when correctly built. Complete Construction Outfit..... **$7.50**

(West of Denver, Colo., and in Canada $8.00)
Ask Your Dealer or Order Direct.

Plans for Model Airplanes



Complete, accurate, ½-size Plans, with Building-Flying Instructions, for any one of the following: New York-Paris; FOKKER; Curtiss; DeHAVILLAND; NC-4 Seaplane; Bleriot; Taube or Nieuport; Cecil Proli— Model Book Free with each plan. Each **25c**

64-pg. Book for Model Builders

Contains plans for building Gliders and Racers, full information about Scale Models; and most complete catalog of Parts, Supplies, Materials and Fittings for all kinds of Models. Postpaid for..... **5c**

Ideal Aeroplane & Supply Co., Inc.
26 West 19th Street, New York City

AGENTS 500% PROFIT

GENUINE GOLD LEAF LETTERS

S guaranteed to never tarnish. Anyone can put them on stores and office windows. Enormous demand, large profits. Paul Clark says: Smallest day $28.70. R. L. Reel made $920 in two months. Write today for free sample and liberal offer to general agents.

METALLIC LETTER CO., 433-B N. Clark St., CHICAGO

Do Your PRINTING

Cards, stationery, circulars, tag, labels, paper. **Complete Outfits, $8.85 up,** Job Presses $11 up, Rotary $149. Card Cutters, $3. Save money. Print for others, big profits. All easy rules sent. Write for catalog presses, type, paper, cards, ink etc. **THE KELSEY CO., T-37, Meriden, Conn.**

DO YOU

WANT a new business profession of your own, with all the trade you can attend to? Then **become a foot correctionist,** and in a few weeks earn big income in service fees,—not medical nor chiropody—easy terms for home training, no further capital needed, no goods to buy, no agency. *Address*

Stephenson Laboratory, 1 Back Bay, Boston, Mass.

PAYS BIG

Show Gibson tailoring and make $100.00 a week and more. Real style, finest made-to-measure tailoring, all-wool fabrics. Remarkable values at $23.50 and $31.50. Sales come wonderfully easy and quick, even if you have no previous experience. **Your customer's satisfaction is always sure and repeat orders come fast for you.** Liberal commissions paid in advance. We handle deliveries, collections and give active co-operation in helping you build a big paying business. High grade sample outfit, with over 100 large wool samples, style book, supplies, etc., furnished you FREE. Don't delay—write for this handsome outfit that will put you into business for yourself.

SHOW $23.50 Tailoring

W. Z. GIBSON, Inc.
500 Throop St., Chicago
Dept. Y-516

Lacquering Is EASY

Costs Less

Done Quicker

Gives Professional Results

Here's what every man driving a shabby car wants. It's the quick, sure way of having a brand new lacquer job—at trifling cost—at small effort. The Royal Spray Attachment—compact, super-efficient, attaches right to your vacuum cleaner, utilizing the full, ready, economical electric power. Simply remove the bag, attach the hose, and slip the Royal Spray Attachment into place. Instantaneous thumb button control. Precision adjustment regulates spray. Sold to you direct by mail, postpaid for only $4.95. Scores of uses around home and garage.

ROYAL *Spray Attachment*

In addition extra money may be earned refinishing furniture and automobiles, spraying insecticides, etc., for neighbors. Order NOW—at this low price—send check or money order with coupon.

Agents Wanted Everywhere

MAIL THIS NOW

The P. A. Geier Co., 540 E. 105th St., Cleveland, Ohio.
Enclosed is $4.95 for my Royal Spray Attachment, postpaid.

Name.....

Address.....

Town.....State.....

Earn $100. Weekly Selling Them!

Automotive engineers claim that 95% energy in gasoline is wasted. With the perfection of a new invention part of this waste gas is turned into added mileage and power. Think of the sales possibilities in offering this new Whirlwind invention that saves car owners hundreds of gallons of gas yearly. Amazing reports show up to

40 Miles on a Gallon of Gas

Owners also report more power, quick starting, instant pick up and disappearance of carbon. Men are now being appointed in each locality to take care of the tremendous demand.

Get Territory Quick

FREE SAMPLE OFFER

A Whirlwind Gas Saver is provided our workers to enable them to equip their own car or carry for demonstration purposes. Send name and address today for this free sample and wonderful money making offer.

Our men can easily make $5000 to $6000 yearly. Spare time workers make $20.00 and even more daily—You too can get this big money.

WHIRLWIND MFG. CO.
999-299 E. Third Street
Milwaukee, - - Wisconsin

NATURE'S FEET NO. 4

"The Fastest Thing on Four Legs in America"

A RECENT writer says "the antelope is the fastest thing on four legs in America." Read what Trapper Evans writes about the antelope:

"The antelope has a big, white spot on his rump. When he scents danger, he immediately broadcasts to the other members of the herd, by raising the white hairs which throw a reflection similar to a mirror. To protect themselves at other times they have another means of signalling. At the base of the white hairs are glands that give forth a musk odor. This tells the herd there is danger. Immediately the herd springs off with great speed. This is made possible because of the springy elastic substance at the base of the heel which gives them speed and sure-footedness."

Trapper Evans

KEDS special models for boys give your feet much of the springiness and speed of the antelope's feet. The soles of Keds are tough, springy. Keds uppers are light yet strong. And the special Feltex innersole keeps your feet comfortable.

Write for our free booklet containing information on games, sports, camping, vacation suggestions and other interesting subjects. Dept. 2470, 1790 Broadway, New York City.

United States Rubber Company

An Offer of the Actual Footprints of the Antelope

By special arrangement with Trapper Evans the makers of Keds are now able to offer you the actual tracks of many American wild animals. Each one is an original, identical footprint—hardened in clay-like material, mounted on felt. Write to Trapper Evans, care of Keds Outdoor Dept. 2470, 1790 Broadway, New York City, enclosing 35c and obtain a track of the antelope sent postpaid in U. S. and Canada. A complete list with prices of the wild animal tracks made by Trapper Evans will be mailed free on application.

They are not Keds unless *Keds is on the shoe*

The "Conquest" Crepe sole. Sure grip, wonderful wear.

Copyright 1928, by United States Rubber Company

Don't fumble and grumble

AN EVEREADY Flashlight will spot a screw-slot in the dark so that a near-sighted man couldn't miss it! Great for little jobs of careful adjustment. And takes half the grief out of any other tedious, time-wasting work that's got to be done in the dark.

An Eveready Flashlight will set you right with the flashlight habit. That implies that you know your batteries, too, and always load your flashlights with genuine Eveready Batteries. Experience will prove that you can't beat 'em. They hold an extra share of endurance that keeps them coming through with plenty of light long after the ordinary kind are in the scrap pile. Loaded to the top with usefulness, they are, and when you reload a flashlight remember that. Get genuine Eveready Batteries always.

CORONA IN COLORS!

Beautiful Duco finishes. Write for new illustrated folder.

L C Smith & Corona Typewriters Inc 812 E. Washington St., Syracuse, N.Y.

SOLDERALL

METAL IN PASTE FORM

PIN A DOLLAR BILL TO THIS

and get this genuine leather 5-window gold corner pass case. Holds Railroad Passes, Auto License, Lodge Cards, etc. Masonic or Shrine Emblem stamped on in gold free. Your name or other stamping 35c extra per line.
Cash must accompany order.

We carry

EVERYTHING MASONIC

Send for free catalogue No. 10 P. M. of Books, Monitors, Jewelry; No. 11 P. M. of Lodge Supplies.

We Have Been in Business 67 Years!

REDDING MASONIC SUPPLY CO.

200 Fifth Ave., Desk P. M. NEW YORK

No excuse now *for* cracked walls

NO NEED to let cracks or holes in your walls or ceilings make a room look shabby. With Rutland Patching Plaster you can easily fix them like new.

You just mix this handy plaster with water and fill the crack or hole. The patch will be as lasting as the wall itself. Rutland Patching Plaster does not crack, crumble, shrink or fall out.

Paint, wall paper and hardware stores sell Rutland Patching Plaster. If your dealer hasn't it, we will mail a package direct and you can pay the postman 30c plus postage. Rutland Fire Clay Co., Dept. V-8, Rutland, Vermont. ***Also makers of Rutland Roof Coating.***

FILMS DEVELOPED AND PRINTED

GIVE YOUR FILMS A CHANCE!

They deserve it. Send for Sample. See what good prints look like. Ask for prices.

FRANK SCOBIE, 43-D, SLEEPY EYE, MINN.

BUILD YOUR OWN CLOCK WITH OUR HELP

Turn idle hours into welcome dollars building clocks, very profitable spare time work. We furnish plans, instructions, works, dials and all materials at low prices.

BANJO CLOCKS, MANTEL CLOCKS
WORKS AS LOW AS $1.65
GRANDFATHER CLOCKS WITH CHIMES

Ask for our attractive FREE Blueprint plan and catalog.

AMERICAN CHIME CLOCK COMPANY, Dept. H
1691 Ruffner Street PHILADELPHIA, PA.

We Tried 129 Times

Then came the formula for this amazing shaving cream, the fastest selling in America. Try it 10 days at our expense before you buy

Gentlemen: When we announced our new shaving cream to the world, thousands of men instantly bought and tried it on our reputation.

Since then, hundreds of thousands have made our free test and proved the claims we make for it, on their own faces—in their own bathrooms. And this is the greatest practical laboratory in the world.

When a man sends the coupon for his trial offer, we know the chances are that he will *continue* using Palmolive Shaving Cream. For most men, we find, never return to former shaving methods.

These 5 important features

1. Multiplies itself in lather 250 times.
2. Softens the beard in one minute.
3. Maintains its creamy fullness for 10 minutes on the face.
4. Strong bubbles hold the hairs erect for cutting.
5. Fine after-effects due to palm and olive oil content.

Now mail the coupon

We take the risk—not you. We undertake to win you in ten shaves. Will you give us the opportunity? Won't you use this coupon, please?

Palmolive Radio Hour

Broadcast every Friday night—from 10 to 11 p.m., eastern time; 9 to 10 p. m., central time—over station WEAF and 31 stations associated with The National Broadcasting Company.

---

10 SHAVES FREE

and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Dept. B-1538, Palmolive, 3702 Iron St., Chicago, Ill. Residents of Wisconsin should address Palmolive, Milwaukee, Wis.

.....

.....

3975 (Please print your name and address)

Step Into Your Own Business

Make $5,000 to $15,000 a Year

operating a **Battery Service Station**

Tremendous profits easy for you to get charging batteries. Customers come right to your door. No soliciting—no hard work. Every time you connect a battery you make 90c clear profit. My Service Station Charger is years ahead of ordinary chargers. You can get all the business in your town. Start in your garage, basement, or rent a store. **$5.00 Down Starts You.**

I've prepared a FREE BOOK explaining how to get into this big pay field. First week's profit pays for all equipment. I explain everything—start you in a business of your own and put you on the way to Big Money. This book is yours FREE. Send for your copy today. Don't delay. Fill in coupon and mail at once.

FREE BOOK-Just Out

C. F. HOLMES, CHIEF ENGINEER
INDEPENDENT ELECTRIC WORKS, DEPT. PM.
5116 RAVENSWOOD AVE. - CHICAGO, ILL.

Send me your FREE BOOK "Big Profits"

Name .....

Address..... City.....

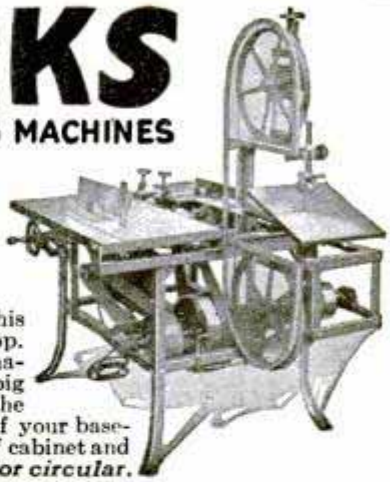
PARKS

WOODWORKING MACHINES

Cabinet Shop Special No. 10

$290

With Motor



You ought to have this handy Parks in your shop. Compact, complete machine designed like a big production outfit at ⅕ the cost. Fits in a corner of your basement. Does any kind of cabinet and joinery work. *Write for circular.*

The Parks Woodworking Machine Co.

1500-40 Knowlton St. Cincinnati, Ohio

Canadian Factory: 208 Notre Dame East, Montreal

OTTAWA LOG SAW ONLY $39

GREATEST OFFER EVER MADE

PUTS THIS OTTAWA TO WORK FOR YOU

BIG BOOK FREE

Make Money! Wood is valuable. Saw 15 to 20 cords a day. Does more work than 10 men. Ottawa easily operated by man or boy. Fells trees—saws limbs. Use 4-hp. engine for other work. **30 DAYS TRIAL. Write today for FREE** book and greatest log saw offer ever made. Shipped from factory or nearest of 10 branch houses.

OTTAWA MFG. CO. Room 1741 W **Wood St., OTTAWA, KANSAS** Room 1741 W **Magee Bldg., PITTSBURGH, PA.**

"Interlox"

MASTER SLIDE RULE

Speeds up all measuring. Slides in and out—no folding. Direct-reading for instant **inside** measurements, as well as outside. Any length, 2 to 8 ft., 20c lineal ft. If not at dealers, sent postpaid.

MASTER RULE MFG. CO., 813 E. 136th Street, NEW YORK

Dealers and Agents: Write for attractive proposition.

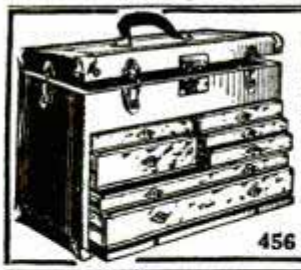
Champion Swivel Bench Vise

Only $2.25 **$2.25 A Bargain**

Just the Vise for the Home Workshop. Draw Bar, Handle and Screw made of Steel. Jaws high-grade steel, knurled and ground. Machine Cut Thread on Screw. All steel parts highly polished. Body and Base are Duceed. No. 30 Radio, Garage and Home Workshop Vise. Width of Jaw 3 inches, opens 3 inches, weight 13 lbs. Shipped in Carton.

Now Is Time to Buy—Order Today

Champion Blower & Forge Co., Dept. "V" Lancaster, Pa.



Gerstner Tool Cases

are unusual values. Selected materials, skilled workmanship, finest finish and the latest designs give a value that cannot be beaten. **Toolmakers and Machinists get our free catalog**

Gerstner & Sons.

456 Columbia St., Dayton, Ohio

MEN WANTED

to become floor surfacing contractors—Pay averages $30.00 per day—no lay offs—your own boss—work the year round—demand ever increasing—New "American" machines do the finest work and are easiest to handle. Complete information sent free without obligation. Write today.

AMERICAN FLOOR SURFACING MACHINE COMPANY

523 S. St. Clair Street Toledo, Ohio

$25 To $50 Per Day Drilling Wells!

Make $25 to $50 per day and be Your Own Boss!

Cash in on demand for good wells in every community! Any man with mechanical turn of mind can easily operate one of our drills, make big money, be independent, work the year 'round! A few hundred dollars starts you in this big paying business—pay balance out of earnings! Write for FREE CATALOG describing ARMSTRONG ALL STEEL WELL DRILLS—gasoline traction or non-traction models.

Write now—today—Armstrong Mfg. Co., 810 Chestnut St., Waterloo, Iowa.

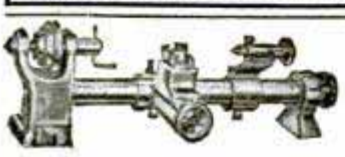
Makes Old Ford a Tractor

Now you can convert that old Ford car into a useful farm tractor without altering any Ford parts. We furnish the traction wheels, drive gears and auxiliary axle and mountings, ready to clamp on to the Ford frame. Pulls 16" plow.

Write for Free Particulars.

Shaw Mfg. Co., Dept. 4508, Galesburg, Kan.

We supply a Belt Pulley also



WADE BENCH LATHE

AMATEUR MECHANICS, REPAIR SHOPS, INVENTORS, STUDENTS

A real machine tool for the home work bench—capacity 4" dia. x 12" length. For **Metal—Wood—Composition Materials.** Turning—Facing—Boring—Drilling—Winding—Thread Cutting. **Accurate—Strong—Quiet—Compact.** Slide-rest has travel entire length of bed. Leadscrew inside bed. **No. 1 Lathe, plain headstock, $26.00. No. 2 Lathe, back-geared headstock, $56.00. Extra for lathes with 16 inches between centers, $7.00.** Complete line of accessories at equally low prices. Write for free catalog.

THE GEROLD CO. Dept. P-45 120 Liberty St. New York

SIMONDS
SAWS FILES KNIVES STEEL

CIRCULAR SAWS THAT MEET EVERY CUTTING NEED

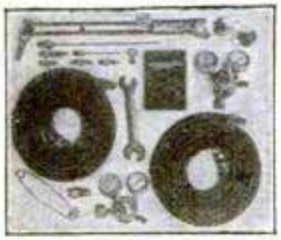
WHETHER you cut wood, metal, rubber, leather, paper, cloth, cork, bone, horn, ivory or slate, you can safely depend upon a Simonds cutting edge.

Simonds Saws, Circular Cutters and Machine Knives mean rapid cutting, fast production, low cost. Specify Simonds for economy!

SIMONDS SAW AND STEEL COMPANY

"The Saw Makers" Fitchburg, Mass. *Established 1832*

BRANCH STORES AND SERVICE SHOPS IN PRINCIPAL CITIES



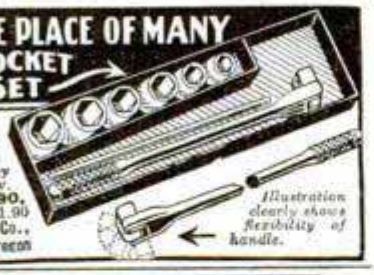
Start a Welding & Battery Shop

Lead Burning Outfits	$18.00 up
Welding Outfits	25.00 up
Soldering Outfits	8.00
Lead Burning Torches	6.00
We'ding Torches	10.50 up
Cutting Torches	30.00 up
Regulators and Gauges	9.50 up
Paint Sprayers	14.00

Welding Supplies

Superior Oxy-Acetylene Machine Co.
P. O. Box 285 Hamilton, Ohio

ONE HANDLE TAKES THE PLACE OF MANY
WITH THIS NEW FLEXIBLE HANDLE SOCKET SET



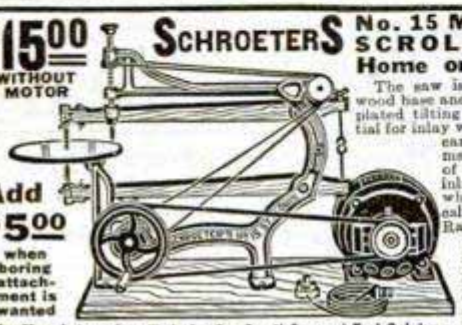
½" square connection. Six sockets 7-16", ¼", 9-16", 5-8", 11-16", ¾" hex openings. Chrome Vanadium steel. Speedy. Guaranteed. Money back if 10 days' trial doesn't satisfy. **$3.65**, prepaid, cash with order; **$3.90**, C. O. D. Handle only, $1.75 cash, $1.90 C.O.D. Accts. Wntd. Tool Service Sales Co., Box 4605, Sellwood Sta., Portland, Oregon

Illustration clearly shows flexibility of handle.

GOODELL-PRATT COMPANY *Tool Makers* GREENFIELD, MASS. U.S.A.

GOODELL-PRATT
1500 GOOD TOOLS

$15.00 WITHOUT MOTOR — SCHROETERS No. 15 Motor Driven SCROLL SAW for Home or Small Shop



The saw is mounted on a neat wood base and has a 7½-inch nickel plated tilting table which is essential for inlay work. The work which can be accomplished is marvelous. Has a range of work from the finest inlay up to 7/8-inch white pine. A practical machine for sawing Radio panels such as bakelite, sheet brass, hard rubber, bone, fibre, etc. Has 16-inch swing. Weight only 21 pounds without motor. We supply a catalog of 250 miniature scroll saw designs with each machine.

Add $5.00 when boring attachment is wanted

For More Information Write for Our Scroll Saw and Tool Catalog

SCHROETER BROS. HARDWARE CO.
810 Washington Ave., ST. LOUIS, MO.

Mechanics Proud of CORNWELL Hand Forged Tools

MORE than 100,000 mechanics throughout the United States are proud of their Cornwell Tools and use no others...Cornwell Tools accomplish results where other tools fail...You can put them to any test...Use them in shop or home and get your money back if you are not absolutely satisfied that they are the finest tools you ever saw...The widespread use of Cornwell Tools is the astounding evidence of their quality.

Tools of Amazing Strength

Chisels, rivet busters, punches, wrenches, screw drivers, pry bars, socket wrenches, universal joints, pliers—for use in garage, shop or anywhere where strong tools are required...Nothing like them in the world—*if you ever saw tools as good as these, return your order and get your money back.*

Test These Tools at Our Risk

Try any test described in booklet...if the tools fail or show the slightest harm, we will instantly replace them or give you your money back...*Can any guarantee be stronger than this?*

Mail Coupon Today

CORNWELL QUALITY TOOLS CO.
Dept. A, Mogadore, O. (Formerly at Cuyahoga Falls, O.)

Send me new illustrated catalog with prices on full line of Cornwell Hand-Made Tools.

.....Where Employed

Name.....

Address.....

City.....State.....

DIAMONDS-WATCHES
CREDIT AT CASH PRICES

Send for FREE Catalog!

Realize your ambition to own a beautiful Diamond or fine watch—buy on payments so easy you'll never miss the money! Write today for your free copy of our big Catalog showing over 2000 illustrations of Diamond Rings, Watches, Fancy Jewelry of all kinds, Silverware, Gifts, etc. Every article guaranteed to be exactly as represented and **all goods delivered on first payment.**

The rings illustrated are solid 18-k white gold set with genuine brilliant blue white Diamonds

WEDDING RINGS
No. 824—The "Elite" solid 18-k white gold **$7.50**
Set with 3 Diamonds, $22.50; 5 Diamonds, $32.50; 7 Diamonds, $42.50; 9 Diamonds, $52.50; 12 Diamonds, $67.50.

WRIST WATCH
No. 866
Solid 14-k white gold, 16 Jewels, $15.00. $1.50 down and $1.50 a mo.

RAILROAD WATCHES — Guaranteed to Pass Inspection

Hamilton No. 992. 21 Jewels, Adjusted to 5 positions. Gold filled 25-Year Qual. Case. $5.00 Down and $5.50 a Month **$55**

Elgin's Latest Raymond. 21 Jewels, 8 Adjustments. Gold filled 20-Year. Qual. Case. $5.50 Down and $5.50 a Month **$55**

LOFTIS BROS. & CO. EST'D 1858
NATIONAL CREDIT JEWELERS
Dept. C-894 108 North State Street, Chicago, Ill.
Stores in Leading Cities

19-JEWEL ADJUSTED WALTHAM NO. 646 —14-k white gold filled; assorted patterns, $42.50; $4.25 down and $1.00 a week.
ORDER DIRECT FROM THIS AD

ELGIN STRAP WATCH
No. 894. A $20 Value. Special at $15.00, $1.50 down and $1.50 a month.

Shoot the Best Gun

The NEW BENJAMIN is the finest air rifle ever made. **Unlike all others.** Has amazing accuracy—shoots hard **and far.** It's the original American genuine AIR operated rifle. One to six pump strokes compress air to any desired degree of power. Same force as in air drills and air hammers except **you control the shooting force.** Never loses force—no springs or levers to get out of order. **Makes crack shots** quickly, inexpensively. Gives years of delightful recreation with utmost safety. At your dealer's, or sent postpaid for $5.00.

Shoot 5 Days FREE

We give you five days, ammunition supplied, to test the NEW BENJAMIN. If in this time you don't believe it to be the finest air rifle you've ever seen or used, and if you don't believe it is the one and only air rifle for you, return it, postpaid, and your money will be refunded at once.

The NEW BENJAMIN AIR RIFLE

America's Original Air Rifle

$5 at your dealer's or sent postpaid direct from factory on FREE Trial as above if dealer does not handle it—write for our wonderful offer.

Get This Book and Details FREE

BENJAMIN AIR RIFLE & MFG. CO.
845 N. Broadway, St. Louis, Mo.

Please send your amazing offer and free copy of "The Shooter's Art," telling how to become a crack shot, how to hold, aim, and handle guns and guide others in use of guns.

*Name*_____

*Address*_____

tired feet

Absorbine Jr. brings prompt relief

Quickly soothing, cooling and comforting to tired, tender feet. Relieves aching and soreness at once Particularly effective after a warm foot bath.

At all druggists', $1.25. Send for free trial bottle
W. F. YOUNG, Inc. SPRINGFIELD, MASS.

Absorbine Jr.

SAVE 1/2 on plumbing, heating, hardware, paint, roofing and millwork supplies. Large quantity buying enables us to offer Grade "A" merchandise at great savings. Send today for free catalog—over 120 pages of enormous bargains.

STANLEY PLUMBING SUPPLY CO., Inc.
400 N. 12th St. Philadelphia, Pa.

Cal. 30-40 Six Shot

KRAG CARBINE
All the qualities of a high price rifle. In fine used condition, all working parts guaranteed for one year. Send today for our Free 50-page illustrated catalog of money saving values; Guns, Ammunition, Cutlery, Sports and Gov't goods.
Terms Cash. No C. O. D.

Price $9.75

W. Stokes Kirk, 1627-P. M. North 10th St., Philadelphia, Pa.

LE PAGE'S GLUE Handiest tool in your workshop.
In bottles, tubes and cans.

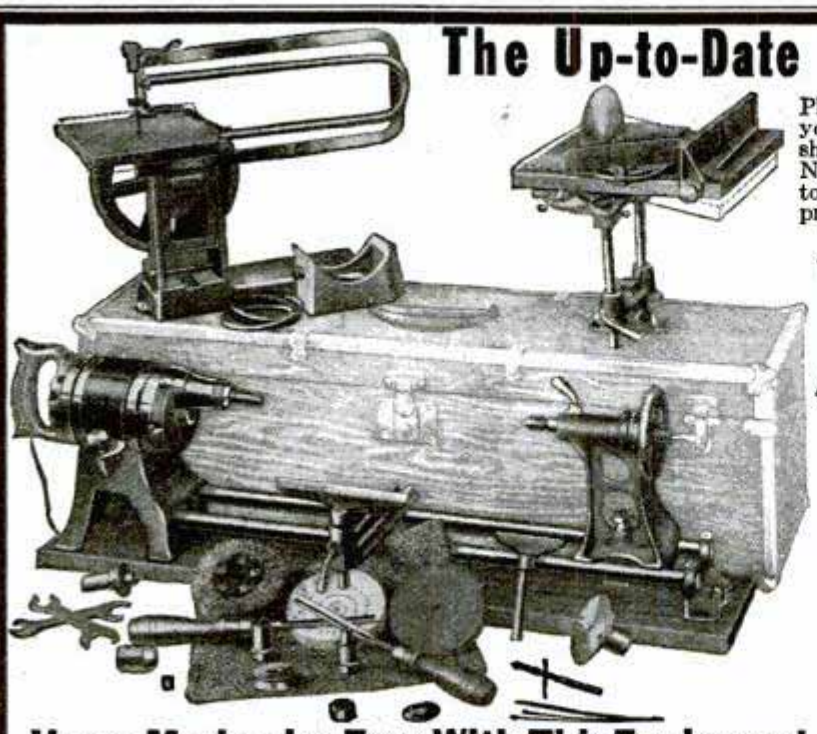
Big commission—MEN'S SUITS
$8.88 FREE SALES KIT

Any one can earn $2,000 extra money yearly in view of low price. Up to date styles, workmanship. Variety of beautiful patterns.
888 Co., Dept. H-7, Fort Wayne, Ind.

A Genuine $2 Knife for $1.18 Postpaid
Handy shaped Blade makes this knife best for mechanics, sportsmen and farmers; light but strong; re-sharpened easily. Stag handle. German silver finish; blades file tested, hand forged from razor steel and warranted.

Direct at Factory Prices
Sample $1.18 3 for $3.00 Postpaid
Hand Forged Razor Steel Blades
Send for our 100-page FREE List and *"HOW TO USE A RAZOR."*
Maher & Grosh Co.
106 A St., Toledo, Ohio

The Up-to-Date Home Craftsman Shop



Plug in on any light socket and go to work. Make your old work bench a modern Up-to-Date workshop. Convenient, portable and simple to operate. Now! You can build, or repair furniture, cabinets, toys, boats, novelties and hundreds of other wood projects. Send for Free literature today.

ONLY $10 DOWN

GUARANTEE

If upon receipt of the Up-to-Date Home Craftsman Shop you are not satisfied, without question every cent refunded and return express charges paid.

NEW 12" BAND SAW

Newly developed, of the latest design in Band Saw equipments, this 12 inch Band Saw is guaranteed vibrationless, and accurate in every detail. It is supplied with a tilting table, miter and side gauge.

$35.00

F. O. B. CHICAGO

May be purchased on time payment basis at $39.00, $10.00 down and $10.00 per month. With this plan anyone can own a real Band Saw.

Home Mechanics Easy With This Equipment

The Shop Complete consists of a Super-power Motor, an accurate Lathe (10" x 34"), a 6" circular saw which features the bevel, miter, side and depth gauges, a Tilting Table, Jig Saw, and all accessories for buffing, grinding, cleaning and all portable or stationary drilling and sawing.

Blueprints and Craftscourse Free to Users. Under supervision of Master Craftsman Eugene Maurey, blueprints and craftscourse giving complete information on home handicraft and details for making hundreds of pieces of woodwork. This service **Free** to Up-to-Date Home Craftsman Shop users. **Your** own terms on purchase **$10.00 down.** Liberal discount for cash.

Our Literature Gives All Details

SENT ON TRIAL

Use our shop for 10 days at our expense. If not satisfied — return — express charges collect.

Mail This

for full particulars to
Up-to-Date Machine Works
2915 S. Wabash Ave., Chicago, Ill.

MANAGER, Dept. 15. Without any obligation, please send me all particulars about your shop, 10-day free trial, free blue prints, free craftscourse, also $10 downpayment offer.

NAME.....

ADDRESS.....

LINDYTYPE AIRPLANE

NEW 1¼-ft. Cross-Atlantic Silver Sea Gull model "Lindytype" Spirit of St. Louis MONOPLANE. Special Introductory Price **$1** Rises from ground and flies 75 ft. or more by own power. Entire model finished in BRILLIANT SILVER LUSTRE. Scientifically designed to the last detail. Even the "Lone Eagle" himself is at the controls! Very educational! Decidedly realistic! Sensational performer! Thrilling fun as it zooms away through the air, banking, turning, soaring before gliding to earth. Easy construction set, all difficult parts formed, put together in evening without tools, complete materials including six inch propeller, adjustable wings, full directions, postpaid U. S. $1.00. Canada $1.20. Satisfaction guaranteed or return outfit in five days and receive money back. Be the first to own one. Order yours NOW!

MODEL AIRCRAFT CO., Box J, CHILLICOTHE, OHIO

Guaranteed to Fly-or Money Back

A SHIP MODEL FOR $4.98

Build an exact replica of the historic Santa Maria or the Mayflower with your own hands. We will furnish the parts cut to fit and ready to assemble complete for only $4.98 plus a few cents for postage. No tools needed except a small hammer. Parts for model of Constitution may be purchased for $6.98.

Write for our illustrated catalog.

MINIATURE SHIP MODELS

Dept. P-10, 3818-20-22-24 Baring St., PHILADELPHIA, PA.

New Way to Make Money

Easy Cash-Sure And Quick

You can easily earn $15 a day or more taking orders from your friends and neighbors for our fine tailoring. Orders come easy when you show our swell samples and smart styles. ***We show you how***—you don't need to know anything about tailoring—simply follow our directions—we make it easy.

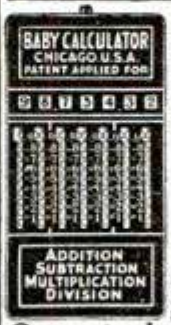
YOUR SUIT FREE

Our new plan enables you to get one of our fine made-to-order suits, in any style you want, without one penny cost to you.

FREE **New, Big Sample OUTFIT** New style, convenient carrying case outfit, large all-wool samples, all supplies necessary to start at once —furnished **FREE. WRITE AT ONCE.**

Progress Tailoring Co., Dept. V216, Chicago

NEW VEST POCKET ADDING MACHINE



Guaranteed

ADDS, SUBTRACTS, MULTIPLIES, DIVIDES

Does work of $300 machine. Guaranteed 5 years. NOT A TOY.

Made of steel and indestructible. Million dollar capacity. Fits in pocket. Will not make mistakes. So simple child can operate it. Instructions furnished. Everybody should carry one for figuring.

FREE TRIAL **$2.50 Total Cost**

SEND NO MONEY—Just name and address. We will ship Calculator immediately. On delivery pay postman $2.50 (Plus few cents Postage). (If outside U. S. send cash.) 10c additional in Leatherette Case. If not satisfied after 10 days' trial you get your money back. THOUSANDS OF SATISFIED USERS.

This is lowest priced practical calculator made. "Why pay more for inferior imitations?" Order from this ad.

Mail Coupon Today

BABY CALCULATOR SALES COMPANY
Dept. 41, P. O. Box 1118, CHICAGO, ILL., U. S. A.

☐ I am enclosing $2.50—send adding machine prepaid.

☐ Send Adding Machine C. O. D. $2.50 plus postage. (10c additional in Leatherette Case)

Name.....

Address.....

City.....State.....

AGENTS Write for big commission and territory proposition.

SW

Don't Miss the Pleasure These BINOCULARS Will Give YOU!

SEE MILES AWAY! PIERCE THE HORIZON!

BRING people, scenes, ships, sports, wild game *to your feet!* New worlds will open for you with these powerful Binoculars. An all-year 'round pleasure-giving investment! All your life they will be a *prized possession!*

FINAL OFFERING! 10 DAYS' TRIAL FREE!

GENUINE imported Binoculars, famous **Premiere Qualité** lenses—not six, not eight, but **10 Power** (10 times magnification). Exquisite illumination. Suited for long distance observation. Thousands sold to Army and Navy Officers, Commanders, Explorers, Big Game Hunters, Sportsmen. Indispensable for races, sports, hunting, vacation, motoring, voyaging, etc. Leather case, neck and shoulder straps. Usually sold for $45.00 to $55.00. Our final offering at **$27.50.** Don't miss this great value!

Our Plan is Different!

It is arousing nation-wide comment! We ask for NO MONEY in advance! NOTHING on delivery. See, try, test, ENJOY, "Binoculars" for 10 Days **ABSOLUTELY FREE!** If pleased you may pay on Budget Plan: **$6.00 MONTHLY**

Or if you prefer to pay cash at end of 10 DAYS, deduct $2.00 and send Check or Money Order for $25.50 in FULL SETTLEMENT. Otherwise return them. Order NOW at this Special Price! **$25.50**

SEAVER-WILLIAMS CO.
Importers, Exporters, International Mail Order House
"2 Generations of Honorable Dealings"
365 WASHINGTON ST., BOSTON, MASS.
Largest Retailers of Binoculars in the World.

Gentlemen:—Send me 10-Power BINOCULARS, $27.50 for 10 days' FREE TRIAL on your "NO Money in Advance—NO Money on Delivery" Plan.

Name.....

Address.....

Tear out—mail ADV. NOW! If a new customer please tell something about yourself. We will appreciate and respect the information. THANK YOU. Pop. M. 8-28

MAKE YOUR FORD Into The "LARK"

$5.00 Red-i-Kut life size patterns

Famous sure-fit *RED-I-KUT* life-size patterns and picture instructions show how you can easily convert your Ford into this **Fast, Saucy, Sporty** Car as thousands have done with easily obtained materials. No need to lay up the car. Rear seat folds, making 4-passenger car. *Send 10c coin for actual body photo and new manual of other distinctive sport body patterns from $5.00 up—"RKO" Steel "Swing-Lo" irons, Tops and Windshields. ORDER RIGHT NOW*

KUEMPEL COMPANY, 99 Kuempel Bldg., GUTTENBERG, IOWA

We start you in business and help you succeed

New plan. No experience or capital needed. We furnish everything. Spare or full time. You can easily make

$50-$100 weekly — Write at once

Madison Shirt Mnfrs. 564 Broadway, New York

EDWARDS METAL ROOFING

BIGGEST VALUE-LOWEST COST

Buy your metal roofing, shingles, Spanish tile, sidings, etc., DIRECT from the world's largest manufacturer of sheet metal building materials, at BIG SAVINGS. Thousands of satisfied users.

We own our own rolling mills. Enormous output insures lowest production costs. Factory-to-consumer plan makes prices **rock bottom.** You get the benefit. Many varieties. Edwards metal roofs last longer, look better. Resist rust, fire and lightning. Roofing, shingles, etc., of COPPER BEARING STEEL at special prices. This steel stands the acid test. Outlasts the building to which applied.

Ready Made Garages and Buildings

Low in cost. Easily erected. Permanent. Good-looking. All types and sizes to suit your purse and purpose. Now's the time for action. Write for Roofing and Material Book No. 150 and for Garage Book.

—FREE—
SAMPLES
BOOKS
ESTIMATES

EDWARDS MFG. CO.
800-850 Butler St.,
Cincinnati, Ohio

Lathes $6.00 to $75.00. Largest line of small lathes in America. Send six cents for 32 page catalog of lathes, drill presses, bench saws, jig saws, band saws, etc.

$10.00 DOWN Brings this Lathe to You

SYPHER MANUFACTURING COMPANY
Dept. D Toledo, Ohio

Catch Fish!

Eels, Mink, Muskrats with our new folding galvanized **STEEL WIRE TRAP.** Write for our **FREE TRAP OFFER** and Bargain Catalog. **$1 Box** of our famous Fish Bait **FREE** to introduce our traps.
WALTON SUPPLY CO., 3502 JUNIATA AVE., ST. LOUIS, MO.

$4.99 22 Cal. Blank Automatic

WITH 100 CARTRIDGES Free! You need no license or permit to own this 6-shot Automatic. Use for **No Permit Required** fun or self-defence, keeps away tramps. Frightens thieves, scares away dogs—a real **home protector.** Fool your friends. Same as an expensive automatic in construction, finish, appearance, durability; automatic magazine loading and ejection of cartridges. Instantly and powerful report. Guaranteed **absolutely safe. Send no money.** Pay expressman $4.99 for automatic with 100 cartridges. **JENKINS, 621 Broadway, New York, Dept. 23-J-8**

MOTORCYCLES

WE WILL TRUST YOU
Pay As Low As $2.00 per Week
Hendersons, Harley-Davidsons, Indians
Slightly used and rebuilt. Hundreds to select from.
Send 10c for list today.
MYEROW BROS. CO., 15 Berkeley St., Boston, Mass., U. S. A.

I Earned $2200 IN FOUR MONTHS

THIS is Richard A. Oldham. He earned $2200.00 in four months with a Haywood Tire Repairing outfit. For 20 years he was telegraph operator on the Illinois Central Railway. He is now 58 years old. He answered my advertisement—quit his job—bought a plant and opened a business. He just wrote me: "I have made more in eight months than 2½ years as operator." There are now 500 stations where tire repairing is neglected.

I Must Have 500 Men
To Fill These Positions

I have a Big interesting Book to send you. It tells all about tires—gives inside figures and profit. Send for it! What Oldham and others are doing *You* can do. $4500 to $7500 per year is conservative. Open a shop. You can get business all around you. Put out a Haywood Sign and business will come to you. Now get started. Send for the Big Book and start making money.

J. A. Schreiber, Pres.

HAYWOOD TIRE EQUIPMENT CO.
2330-L Ogden Ave., CHICAGO, ILL., U. S. A.
Cable Address Fanbro

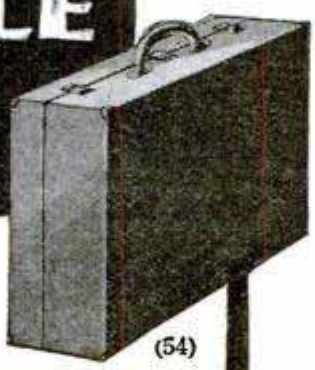
MODEL AIRPLANES

FREE AVIATORS' HELMET

25c to $10 Complete
GLIDERS, TRACTORS, RACERS, CABIN MONOPLANES
CONSTRUCTION SETS

Raw materials; blueprints; everything needed to make your own models.
Write for Illustrated Folder "P". *Dealers' inquiries invited.*
BROADFIELD AEROPLANE CO., Hempstead, N. Y. *Est. 1919*

SAMPLE CASE FREE



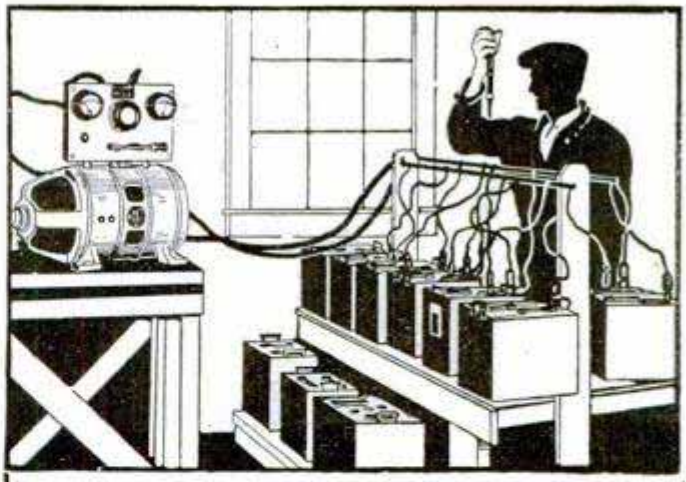
$10 to $35
Made Daily

(54)

9 EASY WAYS TO START

Well-known line of household products—fast sellers—steady repeaters—big profit makers. We supply premiums, samples and advertising. Chance of a lifetime. *Write for New 9 Way Plan.*

McNess Co., Desk L, Freeport, Ill.



You Can EARN
$150 to $300
MONTHLY
Charging Batteries in 8 Hours

Start a Money Making Business of your own. Mechanics, Filling Stations, Repair Shops, Garages and Battery Stations are all making BIG MONEY with HB 8 Hour Battery Service. Recommended by the leading car and battery makers. Constant Potential lets you give a better charge than the other fellow in one-third the time, and at a saving of 30% to 50% on current. Anyone can operate. Check coupon below for full information on how to get started in this money making work.

Shouldn't Cost You a Cent
Pays for Itself—Brings a Big Profit Besides

Only $16 Monthly
30 DAYS TRIAL AT OUR RISK

Largest Profits

Test Bench

Starting, Lighting and Ignition work comes in volume—with the largest profits in Auto Repair—to the shop equipped with HB Test Bench. Priced at least $100 lower than others of similar quality because we build it—not assemble. Check Coupon for more information.

Earn 5 Men's Wages

Paint Spray

Portable Paint Spray does the work of five brush painters. You get four men's wages as profit. Paints Cars, Houses, Garages, Barns, Furniture. No experience necessary to operate. Check coupon for trial offer and terms.

Air Service

Only $12 Monthly

Free Air Service costs you only $12 monthly for a few months. Fully Automatic day and night service will draw customers to your shop as well as operate your air tools. Check coupon for full details without obligation.

HOBART BROTHERS HB
Successful manufacturers ~since 1893~

BOX M88 TROY, OHIO

Tear off and Mail Today

Hobart Brothers, Box M88, Troy, Ohio.
Send me complete information on the items' I've checked—your thirty day trial offer—easy payment terms—information on how HB equipment will increase my earnings.

☐ HB 8 HOUR BATTERY CHARGER
☐ HB TEST BENCH
☐ HB PAINT SPRAY
☐ HB AIR SERVICE

Name.....Address.....

PATE

Protect Your Ideas

Take the First Step Today

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon on the opposite page.

Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trade mark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

NO CHARGE for Information
On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will also send you my "Record of Invention" form on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

My Patent Law Offices Just Across Street From U.S. Pat. Office

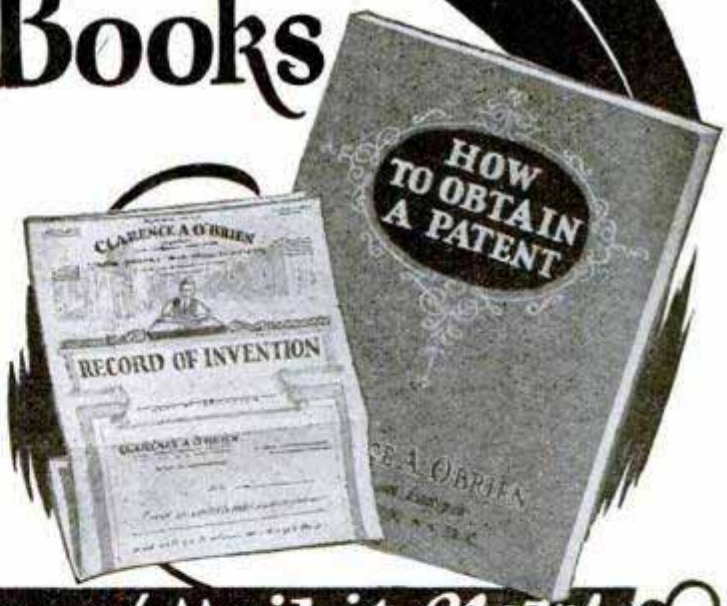
NTS

Above is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ. All drawings and specifications are prepared under my personal supervision.

Inventors Write for these Free Books

Strict Secrecy Preserved

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. Your case will have my personal attention. It is probable that I can help you. Highest references. But FIRST—clip the coupon and get my free book. Do THAT right now.



Clarence A. O'Brien

Registered Patent Attorney

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims.

Practice confined exclusively to Patents, Trade marks and Copyrights

Clip this Coupon *and* Mail it *Now!*

CLARENCE A. O'BRIEN, *Registered Patent Attorney*

70-D Security Savings and Commercial Bank Bldg., Washington, D. C.

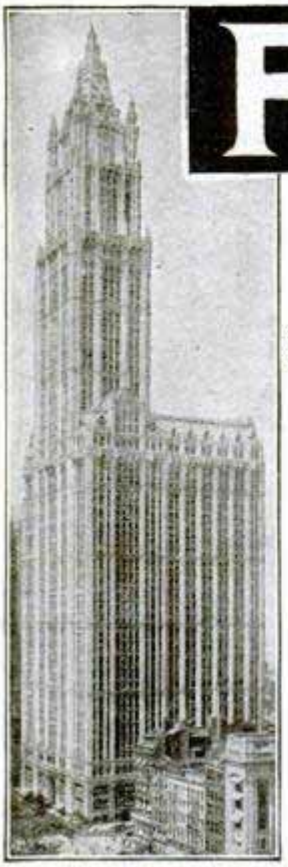
Please send me your free book, "How to Obtain a Patent," and your "Record of Invention" form without any cost or obligation on my part.

Name.....

(*Important: Write or Print name clearly.*)

Address.....

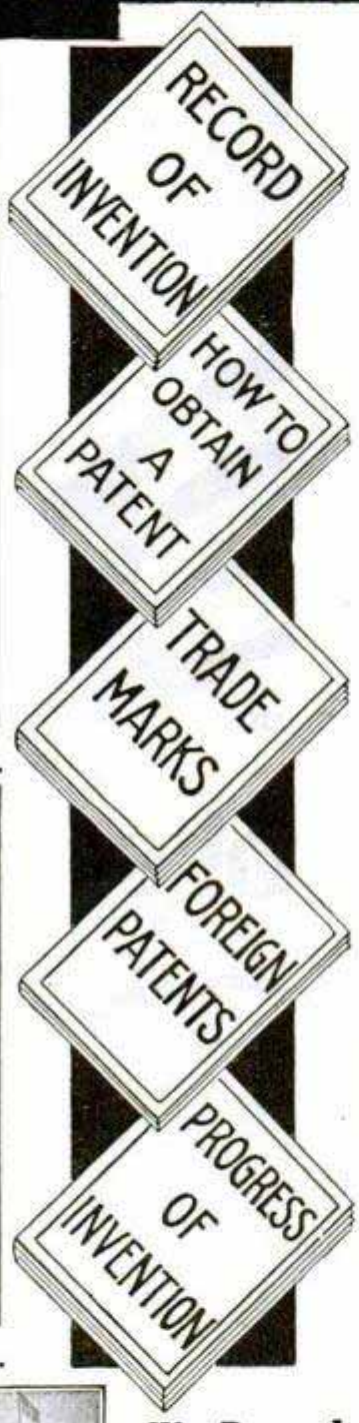
PATENTS TRADE MARKS COPYRIGHTS



Our New York Office
Suite 1007 Woolworth Bldg.

Our Philadelphia Office
Suite 518-519 Liberty Bldg.

Our Washington Office, Victor Bldg.



Have You An Idea?

Our Offer: FOR THE PROTECTION OF YOUR INVENTION

YOUR FIRST STEP

The inventor should write for our blank form

"RECORD of INVENTION"

This should be signed and witnessed and returned to us together with model or sketch and description of the invention for

INSPECTION AND ADVICE

No Charge for the Above Information

Our Five Books Mailed Free to Inventors

Our Illustrated Guide BOOK

How to Obtain a Patent

Contains full instructions regarding U. S. Patents. Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

Our Trade Mark Book

Shows value and necessity of Trade Mark Protection. Information regarding *Trade Marks and unfair competition in trade.*

Our Foreign Book

We have Direct Agencies in Foreign Countries, and secure Foreign Patents in shortest time and lowest cost.

Progress of Invention

Description of World's Most Pressing Problems by Leading Scientists and Inventors.

We Regard a Satisfied Client as our best advertisement, and furnish anyone, upon request, lists of clients in any state for whom we have secured patents.

Highest References—Prompt Service —Reasonable Terms

VICTOR J. EVANS & CO.

PATENT ATTORNEYS

Main Offices: 789 9th St., N. W., Washington, D. C.

Opposite U. S. Patent Office

DELAYS ARE DANGEROUS IN PATENT MATTERS

IMPORTANT! To Avoid Delay!

YOU SHOULD HAVE YOUR CASE MADE SPECIAL IN OUR OFFICE to save correspondence, secure protection and early filing date in the Patent Office. To secure **special preparation** of your case send $25.00 on account with model or sketch and description of invention.

MAIN OFFICE, VICTOR J. EVANS & CO.—VICTOR BUILDING, WASHINGTON, D. C.

Our Lawyers Practice in all U. S. Courts and defend Clients in Suits involving Patents, Trademarks and Copyrights

All Communications and Data Strictly Confidential. Interference and Infringement Suits Prosecuted

OUR ORGANIZATION OFFERS **PERSONAL SERVICE** By Experienced Patent Lawyers, Solicitors and Draftsmen

Our Chicago Office
Suite 1114 Tacoma Building

Our Pittsburgh Office
Suite 514 Empire Building

Our San Francisco Office
Suite 1010 Hobart Building

FREE COUPON

VICTOR J. EVANS & CO.
PATENT ATTORNEYS

NEW YORK OFFICES 1007 Woolworth Bldg.
CHICAGO OFFICES 1114 Tacoma Bldg.
PHILADELPHIA OFFICES 518-519 Liberty Bldg.
PITTSBURGH OFFICES 514 Empire Bldg.
SAN FRANCISCO OFFICES 1010 Hobart Bldg.

MAIN OFFICES: 789-9th Street, N. W., WASHINGTON, D. C.

Gentlemen: Please send me *Free of Charge* your books as described on preceding page.

Name.....

Address.....

PATENTS

TRADE-MARKS · DESIGNS
FOREIGN PATENTS

MUNN & CO.

PATENT ATTORNEYS

Associated since 1846 with the Scientific American

SCIENTIFIC AMERICAN BUILDING
24 W. 40th St., *New York City*

SCIENTIFIC AMERICAN BUILDING
Washington, D. C.

TOWER BUILDING
Chicago, Ill.

VAN NUYS BUILDING
Los Angeles, Cal.

HOBART BUILDING
San Francisco, Cal.

Books and Information on Patents and Trade-Marks by Request.
Associates in All Foreign Countries.

$300,000
For This Invention

That's what Eastman Kodak paid for the Autographic idea. Thousands of other inventions are needed and offer enormous opportunities for earning fortunes. If you are of an inventive turn of mind why not concentrate on things that are really NEEDED. Get Raymond Yates's new book

"1000 NEEDED INVENTIONS"

Costs only $1.25 and may start you thinking along the right lines. You'll get nowhere just fussing around. Concentrate on what the industries need, and on what the public wants. Mr. Yates's book tells you what these things are. Send no money. Just write postal. Pay mail man $1.25 plus postage when book arrives. Your money back if you want it. This offer limited. Write now and get on the right track. (*Outside U. S. $1.45, cash with order.*)

BUREAU OF INVENTIVE SCIENCE
Dept. 38, Wisner Building, Rochester, N. Y.

PATENTS

Trade Marks, Copyrights, Patent Litigation Handbook with illustrations, 100 mechanical movements. Sent free on request.

ALBERT E. DIETERICH
formerly member examining corps U. S. Patent Office
PATENT LAWYER and SOLICITOR
621-A, Ouray Bldg.
27 Years' Experience Washington, D. C.

PATENTS

Send us sketch or model for advice and exact cost of patent. Our book **"How to Obtain a Patent"** sent free. It tells how to apply for Patents, Trade Marks, Foreign Patents, Copyrights, etc.; gives information on Patent Procedure; tells what every inventor should know. Thousands of Inventors, who are our clients, are our reference.

CHANDLEE & CHANDLEE, 25 Years' Experience
410 Seventh St. Washington, D. C.

PATENTS

Booklet Free Highest References
Promptness Assured Best Results
Send drawing or model for preliminary examination of Patent Office records.

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

Listed Patent Lawyer in the latest editions of the Rand-McNally Directory of Bankers and Attorneys, of Chicago, Ill.; The Baggott & Ryall Directory of Attorneys, New York City; The Lawyers Guaranteed Directory, Detroit, Michigan; The Lawyers and Bankers Quarterly, published by the Legal Directory Publishing Company of St. Louis, Mo.; the American Lawyers Annual, Cleveland, Ohio.

WATSON E. COLEMAN,
REGISTERED PATENT LAWYER

Victor Building, 724 Ninth Street, N. W.
WASHINGTON, D. C.

PATENTS

To the Man with an Idea

PATENTS Procured. Trade Marks Registered. —A comprehensive, experienced, prompt service for the protection and development of your ideas. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request.

IRVING L. McCATHRAN, Patent Lawyer,
Formerly with and successor to RICHARD B. OWEN
200 Owen Bldg., Washington, D. C.
41-E Park Row, New York City

TRADE-MARKS REGISTERED

PATENTS

As one of the oldest patent firms in America we give inventors at lowest consistent charge, a service noted for *results*, evidenced by many well known Paterts of extraordinary value. *Book, Patent-Sense, free.*
Lacey & Lacey, 648 F St., Wash., D.C. Estab. 1869.

BLUE BOOK ON PATENTS

AND PRIORITY RECORD BLANK GRATIS.

MONROE E. MILLER, PATENT LAWYER
411-2 Ouray Building, WASHINGTON, D. C.
ELECTRICAL AND MECHANICAL EXPERT

EDGAR M. KITCHIN
Attorney & Counsellor at Law
Patent and Trade Mark Specialist 805 G St. N. W., Washington, D. C.

DIE-CASTING MACHINES
R. BYRD. 318 REED, ERIE, PA.

A PERFECT LOOKING NOSE
Can Easily Be Yours

Trados Model No. 25 corrects now ill-shaped noses quickly, painlessly, permanently and comfortably at home (excepting cases caused by improper bone structure). It is a safe and guaranteed patent device of precise adjustment that will actually give you a perfect looking nose. Over 90,000 satisfied users. For years recommended by physicians. 16 years of experience in manufacturing Nose Shapers is at your service. **Model 25 Junior for children.** Write for testimonials and free booklet, which tells you how to obtain a perfect looking nose.

M. TRILETY, Pioneer Noseshaping Specialist
Dept. 3070 Binghamton, N. Y.

One Year To Pay

No. A288 — $59
$5 Deposit — $1 A Week
A fine quality, fiery, genuine blue-white diamond full of sparkling brilliance is set in this unusually attractive ring. The artistically engraved mounting is 18 Kt. solid gold set with 2 dark sapphires. Can't be duplicated for $100.
18 KT.

No Red Tape — 10 Days Trial

SEND NO MONEY After you get the ring, pay only $5.00 to the postman. If you keep it, pay only $1.00 a week for one whole year. **DON'T BOTHER WRITING A LETTER:** Just pin this ad to a piece of paper with your name and address, finger size on it and state whether white or colored.

We are an old established firm of diamond importers. **Money Back GUARANTEE. You take no risk.** If you are not satisfied that the ring is the biggest bargain you ever got, return it within 10 days and **we will refund every cent you paid.** All credit dealings kept strictly confidential. No delay.

PRICE CUT TO $59.00 — WORTH $100.00

You can now buy this gorgeous ring at the wholesale price. Compare it with similar rings at $100. We guarantee it to **stand any test or comparison.** Greatest bargain offered by any Diamond Importer. **We allow 8% annual increase** in exchange for a larger diamond ring.

Write for FREE Illustrated Catalog

It brings our large Jewelry Store right into your home. Gives weights, grades and complete description so you can buy diamonds like an expert. Gives information other jewelers dare not tell.

AGENTS WANTED—EARN $200 WEEK. WRITE FOR DETAILS

STERLING DIAMOND & WATCH CO. INC.

DIAMOND IMPORTERS—$1,000,000 STOCK—ESTABLISHED 1879
1540 BROADWAY DEPT. 2501 NEW YORK

PATENTS

Don't Lose Your Rights To Patent Protection

Before disclosing your invention to anyone send for blank form **"EVIDENCE OF CONCEPTION"** to be signed and witnessed. As registered patent attorneys we represent hundreds of inventors all over the United States and Canada in the advancement of inventions. The form "Evidence of Conception," sample, instructions relating to obtaining of patents and schedule of fees sent upon request.

LANCASTER & ALLWINE

480 Ouray Bldg. **WASHINGTON, D. C.**
Originators of forms "Evidence of Conception."

INVENTORS PROTECT YOUR IDEAS

Send for our Guide Book, **HOW TO GET A PATENT,** and Evidence of Invention Blank, sent Free on request. Tells our terms, methods, etc. **Send model or sketch and description of your invention for INSTRUCTIONS. No charge for the above information.**

RANDOLPH & CO.
301 Victor Bldg., WASHINGTON, D. C.

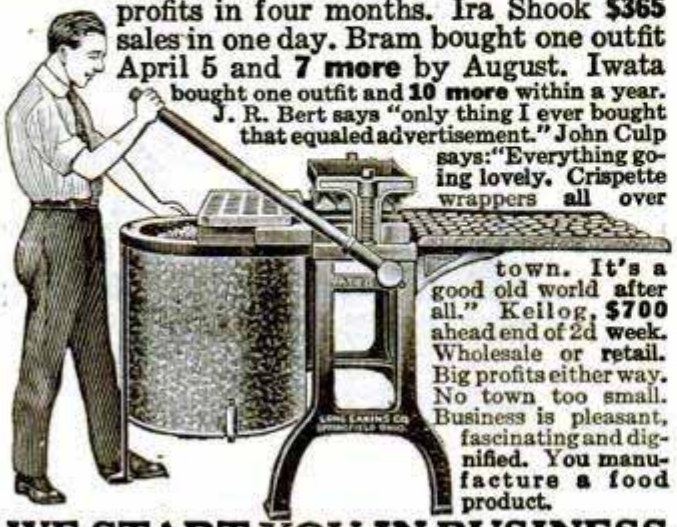
NAME_____

STREET_____

CITY_____ STATE_____

$351.00 CLEARED IN ONE DAY

So writes W. H. Adams of Ohio. Letter from California man reports **$11275** sales in three months; New Jersey **$4000** profits in two months; Pa. **$3000** profits in four months. Ira Shook **$365** sales in one day. Bram bought one outfit April 5 and **7 more** by August. Iwata bought one outfit and **10 more** within a year. J. R. Bert says "only thing I ever bought that equaled advertisement." John Culp says: "Everything going lovely. Crispette wrappers all over town. It's a good old world after all." Kellog, **$700** ahead end of 2d week. Wholesale or retail. Big profits either way. No town too small. Business is pleasant, fascinating and dignified. You manufacture a food product.



WE START YOU IN BUSINESS

Furnish secret formulas, raw material and equipment. Little capital required; no experience needed.

Build a Business of Your Own

No limit to the sale of Crispettes. Everybody likes them. It's a delicious food confection. Write for facts about a business that will make you independent. Start now, in your own town.

PROFITS $1000 MONTH EASILY POSSIBLE

Send postal for illustrated book of facts. It contains enthusiastic letters from others—shows their places of business, tells how and when to start, and all information needed. Free. Write now!

LONG-EAKINS COMPANY
828 High Street Springfield, Ohio

Motorize Your work shop!

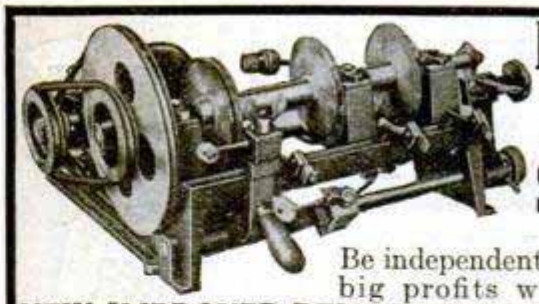
Free Trial!

SPEEDWAY SHOP Easy to make things at home with this big new metal and wood-working shop. Attaches to any lampsocket. $10.00 down—easy payment. Make money in your spare time. Big free illustrated book gives full particulars, including free trial offer. Send 25c for instructions for making attractive magazine basket. Write Electro Magnetic Tool Co., Dept. 2-A2, 1830 S. 52nd Av., Cicero, Ill.

MOVIES AT HOME

Many models of genuine MOVIE MACHINES, some as low as $3.75, all using standard size big theatre films. Our stock of films is the most complete and lowest in price—with an exchange service. Films of leading stars and religious subjects are available. DON'T DELAY. WRITE FOR FREE INTERESTING CATALOGUE NOW!

PARAMOUNT MFG. CO.
Dept. 1371-B BOSTON, MASS.



DON'T BE A SLAVE

Be independent and make big profits with the—

NEW IMPROVED BEISSER KEY MACHINE

You can start a business of your own, no experience necessary. The only key machine that cuts ALL kinds of keys. No hand-filing. Make first keys by number without taking locks apart. Locksmith instructions furnished free. Good Proposition for Agents. *Write Today.*

BEISSER KEY MACHINE COMPANY
407 Fort St. East Detroit, Mich., U. S. A.

AIRPLANE

12-inch scale model of Lindbergh's Spirit of St. Louis. Scientifically designed and very realistic. Only scale model priced under five dollars that will rise from ground by own power. Flies 30 ft. or more and stays in air 8 to 10 seconds. Easily built in 2 or 3 hours. No tools needed. Construction set, with all parts and full directions, postpaid in U. S., only 50c. (no stamps). Satisfaction or money back. Send today.

Mann & Benton, Chillicothe, O.

DENINGER WILL TRUST YOU

$40

SEND 50c IN STAMPS FOR CATALOGUES
BIG MONEY SAVING FOR YOU

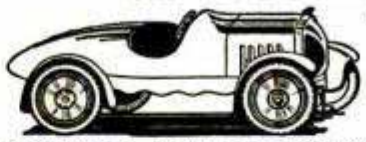
Used and rebuilt motorcycles $25 to $100, used bicycles $9.50, tandems $20. All machines fully guaranteed. New bicycles and motorcycles at factory prices, save dealers' profits. Motorcycle and automobile tires $3. Complete line frames, engines, supplies.

DENINGER PRICE CUTTER, ROCHESTER, N. Y.

PAY AS YOU RIDE

Sport Bodies for Fords

AT FACTORY PRICES!



This Model in Grey Prime **$38.50**

Write for Booklet A-2 Showing This and Other Models

SPORT FACTORIES, AURORA, ILL.

"KNIVES THAT BITE"
made by
REMINGTON ARMS COMPANY, Inc., 25 Broadway, NEW YORK CITY

Your Own Business—Steady Income!

Many are making big money in the saw-filing business with the Foley Automatic Saw Filer. Nels Emstad, Albert Lea, Minn., writes,

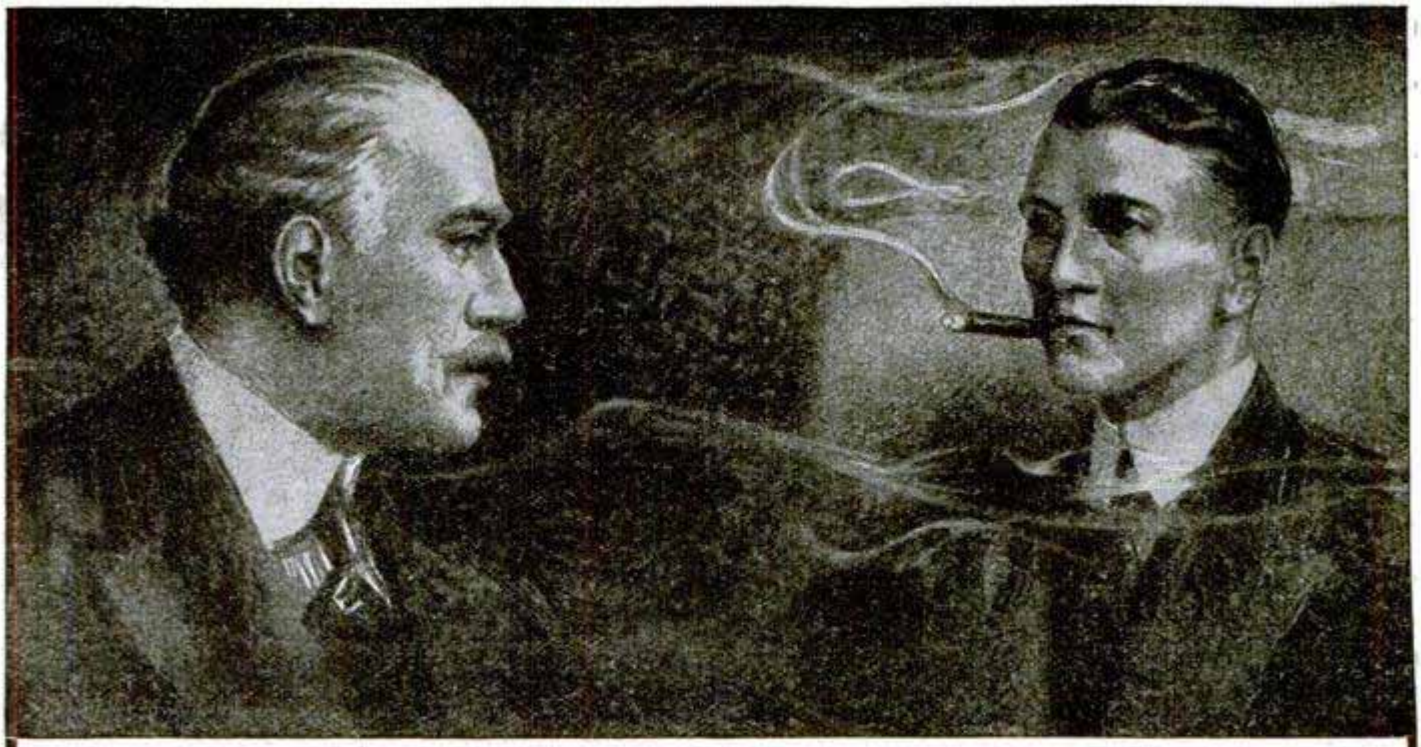
"The filing business is good. I get all the work I can do. . . . The Foley Filer is an absolutely true machine and cannot be excelled."

The FOLEY AUTOMATIC SAW FILER

does the work automatically, with machine precision and twice as fast as hand-filing. Easy to run. No experience needed. No canvassing—our FREE Plan starts you right. Big market among carpenters, factories, schools, farmers, meat markets, etc.

Start in Spare time. Make $15 to $20 a week extra income while building a permanent business. Address—

Foley Saw Tool Co., Inc., 230 Foley Bldg., 9 Main St. N. E., Minneapolis, Minn.



Tobacco Is Hurting You

Look at the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For you know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but **sure.**

Tobacco is lowering your efficiency. It slows a man down. Makes it harder for you to concentrate your mind on your work. You haven't near the amount of "pep" and energy you would have if you stopped using it. There's many a man twice as old as you in years who's twice as young in energy, simply because he lets tobacco alone.

Some day you will realize to what an alarming extent tobacco **has** undermined your system.

When your hands begin to tremble—
and your appetite begins to fail—
and your heart seems to "skip a beat" now and then—
and slight exertion makes you short of breath—
then you have a right to suspect that TOBACCO is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And **YOU** know that the use of tobacco in **any** form is an **expensive, utterly useless** habit. You know you **ought** to quit.

Tobacco Habit Banished

Let Us Help You

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it—whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a very few days. Not the slightest shock to the nervous system. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

It is in no sense a substitute for tobacco. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves and make you feel better in every way.

Results Guaranteed A single trial will convince you. Our legal-binding, money-back guarantee goes with each full treatment. We will refund every cent you pay for the treatment if after taking it according to the easy-to-follow directions, it should fail to banish the tobacco habit completely.

SEND Coupon for Free Proof Let us send you our **free** booklet on the deadly effects of tobacco, together with testimonial letters from men all over the country telling how they have been absolutely freed from the tobacco habit by this simple **home** treatment. You could not ask for stronger proof that **Tobacco Redeemer** will **free you** from the habit than the evidence we will gladly **send on** request. **Just** mail the coupon—or a postal will do.

NEWELL PHARMACAL CO.
Dept. 300 Clayton Station St. Louis, Mo.

Free Book Coupon

NEWELL PHARMACAL CO.
Dept. 300 Clayton Station St. Louis, Mo.

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that **Tobacco Redeemer** will positively free me from the tobacco habit or my money will be refunded.

Name .....

Street and No. .....

Town..... State.....

Now! HOUSEHOLD LACQUERING UNIT
You can easily dress up Your own Furniture, Screens, etc.

ONLY $15.00

FREE FREE
15-foot roll of Paasche Masking Tape with each Unit. Used for clean-cut color edges, shielding and stenciling.

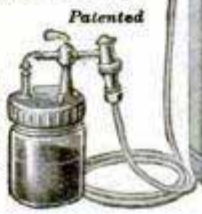
It's Amazing how easy you can now paint with this Outfit

Brighten Up The Home
Until now the home owner had to be content with the old-style slow hand brush, with its unsightly laps and brush marks and uneven coverage. Now you can spray lacquers, paints, varnishes, enamels, shellacs and bronzes and make the work easier, look better and finished much faster. Now you can brighten up the home with your choice color schemes. This outfit has been tested and approved for home use and is the latest product of the world's most complete line of airbrush equipment.

Paint Your Own Auto
With this unit you can obtain beautiful results, always smooth and uniform—secure any shade—spray intricate pieces as easily as flat surfaces—produce rich blends—veiling effects, and any finish, and as an aid in antiqueing furniture, this unit has no equal. Also don't overlook your auto—now you can keep it bright and new looking. Manual training classes of high schools everywhere find this an inexpensive unit and valuable in teaching this finishing method. Now do it better with a Paasche Spray Outfit.

THIS UNIT CONSISTS OF
One Paasche J. D. ½ Pint Sprayer, Hand Pump, Tank with Gauge, Fittings and 8 foot Hose.

Patented



Paasche Airbrush Co.
J. A. PAASCHE, *President*

Also Finer Outfits for Artists and Larger Power Outfits for Painters and Manufacturers.

Write for FREE FOLDER

1951 Diversey Pkwy., CHICAGO, ILLS.

CROSLEY Super Musicone Speakers $6.90. Radiola No. 16 chassis $25. Atwater Kent 5 tube sets $20. Kodel A eliminators $3.50. Require slight repairs and 2 amp. Tungar tubes. 30 henry chokes $1. 2 mfd condenser blocks 65c. Saal speaker units $2.00. Deresnadyne de luxe table model cabinets with speaker and eliminator compartments $7.75. Speaker plugs 25c. UX280 full wave tubes $1.90. UX sockets 25c. Bakelite dials 15c.
Send money order with order.
Chas. Hoodwin Co., 4240 Lincoln Ave., Chicago, Ill.
DEALERS IN BANKRUPT STOCKS

IDEAS! A handy manual of 36 pages and cover—88 illustrations—over 20,000 words—practical — concise — understandable—prepared by Austin C. Lescarboura and our engineering staff. That's "The Gateway to Better Radio"—yours for 25c, from your dealer or direct from us.
American Mechanical Laboratories, Inc.
Specialists in Variable Resistors
285-7 N. Sixth St., Brooklyn, N. Y.

34 in. Waco Craftsman's Lathe

START YOUR SHOP NOW — ONLY $30.00

Use any kind of power—any motor, ¼ H.P. or greater and in this offer you get the **BEST LATHE EVER MADE AT TWICE ITS COST.** Complete with NEW two-step cone pulley Belt Drive Ballbearing Headstock—screw tightening tailstock, 45 in. rail lathe bed, wood center, dead center, face plate, turning tools and wrenches—complete with WACO guarantee of complete satisfaction. ASK ANY OWNER.

SAME TOOLS — SAME QUALITY AS OUR FAMOUS Red Jacket EQUIPMENT

WACO Power Bench Saw Complete with 6 inch blade.....$24.00
New Two-Step Cone Pulley, Belt Drive Ballbearing Headstock..$15.00
WACO Buffer set—scratch, emery rag, with attachments, set..$5.00
WRITE FOR OUR LITERATURE—IT'S FREE—IT'S INTERESTING

The New Waco Headstock
allows the use of any motor you now own—enables you to start a Home Work Shop at small cost. Be sure to get our new IDEA CATALOG—send the coupon now.

Waco Tool Works, Inc.
542 No. Parkside Ave.
Chicago, Ill.

This Coupon Brings All the New "Shop Dope"
No obligation—Simply fill in and mail
Waco Tool Works, Inc., Dept. 108, 542 N. Parkside—Chicago.
Please send me your free Idea Catalog.
Name.....
Address.....
City.....

Ten Mile Eyes!

10 POWER

$21.75 Pre-paid

"Cheap at $50"
—Says Navy Man

Buy Direct—Save Half

TEN MILE EYES! Think of the things you can see! Ten mile radius —a 20 mile circle—nearly 400 square miles. And you can easily have them. If you can see one mile, these superpower French 10x30mm stereo-prism binoculars will extend your vision 10 TIMES. ENJOY YOURSELF 10 times more! Multiply pleasures of hobby and sport. Use a pair touring, observation, hunting, golfing, nature study, astronomy, etc. Superbly made for a lifetime of service. Case and straps free.

10 Lenses

Did you know many ordinary field glasses have but four lenses and most of the better ones only six? But this binocular has 10 LENSES and 4 PRISMS. No wonder it gives an expansive field, brilliant illumination and fine definition.

4 Prisms

Extra Power without Extra Cost

Send $21.75 today for one on FREE TRIAL. Or $1 for one C. O. D. Pay postman balance and few cents postage. Check and compare it in every way for five days with others selling for double or more. If you do not like it for any reason whatever your money will be promptly returned. Every glass tested. The U. S. Gov't and State Forestry Dept's buy from us. The same in 8x only $18.50. Surpasses others at $23.50 and more.

FREE TRIAL

CATALOG Over 200 Glasses All Makes—$1—$110

Everything in binoculars, field glasses, telescopes and optical instruments. The finest and largest assortment in America. Catalog gives all information how to choose the best for your individual needs at the LOWEST PRICE.

Try America's Leading Binocular House First

Du Maurier Co., Dept. 208, Elmira, N. Y.

Dress up! YOUR CAR

WIND MILL RAINBOW FLASHER $1.90

Just Patented—**Most beautiful light in the world** — *Spins with the wind.* All colors of the Rainbow—Red, White and Blue, *Red, Green or White for Coupe and Fenders* — **Nothing like it.** Rain and Weatherproof—Self Lubricating. Anyone can attach this non-glare Wonderlight to any auto, truck, cycle, airplane, canoe, radiator, side top. Furnished complete. **Send No Money!** Pay postman $1.90 plus a few cents postage when you receive the flasher. *Money Back Guarantee.* Millions will be sold—**Be first. Write Now. Agents Wanted.**

GO-LIGHT CO., 76-N. Milford Ave., NEWARK, N. J.

See Miles Away

Big 3½ Ft. Telescope

Lend wings to your eyes! People and objects miles away seem close. Wonder telescope brings new pleasures to home, farm, camp, travel, sport. Study the mysterious Sun spots; see Moon and Stars as never before. See people on the beach, on the mountains, etc.

FREE Yes, absolutely free! A handsome leatherette Carrying case and Shoulder Strap. Also Solar Eye Piece to view the sun—a special feature, found only on expensive instruments.

5 Sections 8 Power Lenses

Brass bound; measures 12 in. closed; powerful achromatic lenses protected by dust caps.

Thousands Pleased

P. Brush wrote: "Watched submarines three miles off coast." C. Scribner: "See lighthouse 18 miles away." Mrs. Yarbrough: "Could tell color of aeroplane four miles away." E. M. Gearhart: "Can see men working seven miles away."

5 DAY TRIAL

CLIP THIS AD

SEND NO MONEY

On delivery of Telescope, free Case, Strap and Eye Piece pay Postman only $1.85, plus postage (2 complete outfits $3.50), or send price with order and we'll pay postage. Satisfaction guaranteed or money refunded. Send today, entertain your friends! Be first.

FERRY & CO., Dept. 1779, Chicago, U. S. A.

Yes You Can make $25 to $75 per day $6,000 to $10,000 per year

Why start in—or continue to work for someone else for $20 to $50 a week when you can make that much in a day, and be your own boss?

Why not realize your ambitions to make big money now in a highly respected business —instead of drudging five—ten —fifteen or twenty years and then maybe falling short of your goal?

Do like thousands of other men have done. Strike out for yourself. Get all the pay for your own work—not just part of it. It's easy—the way is *certain —safe* and *sure*. No chance for failure. There are big pay jobs everywhere for Clarke FlorKraftsmen — for every building needs the work you can do.

START NOW! No tuition or long study necessary. Fifteen minutes shows you how—a few days practice makes you expert.

You want money—you want to succeed—to be respected in your community. Then be a Clarke FlorKraftsman. Men just like you who have seen our previous announcement are making big money now. You can too! The first step—send the coupon. No obligation.

CLARKE SANDING MACHINE CO.
Dept. T-8
3831 Cortland Street
CHICAGO, ILL.

Originators and for 11 years Manufacturers of Portable Sanding Machines.

POWERFUL—FAST CUTTING
CLARKE
VACUUM PORTABLE SANDER

answers all calls

CLARKE SANDING MACHINE CO.,
Dept. T-8, 3831 Cortland St., Chicago, Ill.

Gentlemen: Please send me the facts about CLARKE FLORKRAFTSMANSHIP. No obligation to me.

Name.....

Address.....

City.....State.....

This Home $28.00 a Month!

Pay Like Rent

Now you can build your Liberty Home and pay for it like rent—less than rent! Liberty just perfected an amazingly thrifty time payment plan by which you can get complete materials for this beautiful home for only $239.00 down and $28.00 a month. Cash price $796. 5 large rooms, bathroom, 2 closets, roomy porch. 43 other homes from $14.00 to $45.00 a month.

No Red Tape—No Mortgage—No Delay

No extra charges beyond monthly payments. Price includes all highest quality lumber cut to fit, doors, windows, stairs, high grade interior woodwork, lath, shingles, hardware, glass, paints, nails, etc., complete. Working plans, instructions Free. All materials fully guaranteed. Freight paid to your station.

FREE HANDSOME BIG BOOK OF HOMES—FULL COLOR—WRITE

Describes 44 home plans from the cozy 4, 5 and 6-room bungalows to the 9-room 2-story. Shows how skyscraper system of buildings will give you a solid, substantial, permanent home at 30 to 40% saving. No waste, no worry. *Your rent will pay for your home.*

Owners Save $200 to $1500

No middlemen—you deal direct with mill and save 4 big profits. Mrs. Coombs saved $1000. B. A. Anderson saved $500. F. E. Davis saved $1000 to $1500 the Liberty way. You can do as well. 31 years of square dealing behind our guarantee. Write or send coupon for Free Book *Today.*

Liberty Homes,
Lewis Mfg. Co.,
Dept. 12-H, Bay City, Mich.

Please send me Free your new Book of Homes, illustrated in color. I understand that this puts me under no obligation whatever.

Name.....

Address.....

City.....State.....

LIBERTY HOMES Lewis Mfg. Co., Dept. 12-H Bay City, Michigan

$18.50 to $22.50 Profit Per Order!

108 in. high — 34 in. wide

More men wanted. No experience required. Every order for time or cash pays commission of $18.50 to $22.50. Easy to earn $100 a week. Store owners, theatres, cafes, hotels—all are prospects for the new, gorgeously colored

"DAZZLER" Electric Signs

Genuine Duco finish, double faced, with corrugated steel faces, such as have heretofore been used only on the highest priced signs. Special extra wide letters—10 inches—of raised opal glass in center section. The letters of top and bottom lines are of silver aluminum. Furnished in five gorgeous color combinations.

Merchants discard old signs and buy the **Dazzler.** One sign sells another. The **Dazzler** is lower in price than any other high grade electric sign made.

Write Today!

for our beautifully illustrated literature showing Dazzler Electric Signs in full color, also our money making proposition and exclusive territory arrangement. Don't wait! You can get in the big money class as our representative. Write at once.

CHICAGO SIGN SALES CO.,
Dept. 22 **Charlotte, N. Car.**

Portable electric planer for woodworking

Pulley Drive **Only $25**

J. D. WALLACE & CO.
Adams St. and California Ave., CHICAGO, ILL.

Ship Model Builders

Before purchasing your model supplies at prohibitive prices, send for our big, new, illustrated catalog showing nearly all the hard-to-make materials such as caps, tops and crosstrees of celluloid, brass pumps, figureheads, taff rail posts, blocks, deadeyes, etc. Also model speed boat fittings and construction sets at very reasonable prices. Catalog 10c coin.

ROY HANCOCK. 323 Douglas Ave., Portsmouth, Va.

INVENTION WANTED

An important manufacturer is in the market for a machine that will stamp printed matter on Golf Balls at the rate of several hundred an hour. Manufacturer will buy the patent outright, pay royalty, or listen to any reasonable proposition. The machine must be able to use 2 sizes of type and print in colors clear around the equator of the ball.

Address letters to—

POPULAR MECHANICS MAGAZINE
Dept. 603, 200 East Ontario Street, CHICAGO, ILL.

$12.00 A DAY

Big Steady Income

SELLING **$23.50** ALL-WOOL **Union Tailored Clothes**

Own your own business. Be your own boss. No capital required. We furnish everything. Train the inexperienced. Commissions paid in advance. Liberal bonus besides. No collecting. No delivery. You show and sell. We do everything else. Two prices. $23.50 $33.50. **Biggest Values That Sell On Sight.** Every garment made-to-measure. Unlimited co-operation and sales help. Guaranteed customer satisfaction brings 90% repeat business. Reliable house that invites investigation. Two thousand men now making good. Opening for two hundred more. Write at once for complete information.

Extra Large Swatch Samples that Sell
Over 100 woolens twice ordinary size. Thirty-two styles. Supplies, sales helps, advertising, complete custom tailoring equipment FREE. Sent prepaid for actual examination to men with qualifications required.

A BIG LINE for BIG MONEY!

Dept. V 1116

Pioneer Tailoring Co., Congress & Throop, Chicago

---

yes! you can now DOMINATE Static —

Roger's Underground Antenna taps the clearer, stronger, more powerful underground radio waves, unspoiled by static and less affected by weather. A marvelous invention that enables you to *dominate* static and get purer, louder reception and more distance. Try it this summer. FREE comparative test on your own set. Write for full particulars today.

THE UNDERGROUND ANTENNA CO.
4209-A Cottage Grove Ave. CHICAGO, ILL.

NEW AUTOMATIC WINDOW WASHER

Washes-Cleans-Dries-Polishes in ONE Quick Operation

Patent Pending

Amazing new invention completely revolutionizes window washing. **Carries its own water supply!** It eliminates all the drudgery and unpleasantness. **Five times** as fast as old methods! **No pail. No brush. No sponge. No chamois. Your hands never touch water with the NEW AUTOMATIC.** Can be used with or without pole. Every housewife, auto-owner, storekeeper and factory owner a live prospect. Sensational demonstration. Sells at sight. Big repeat business. Year 'round seller.

MAKE $90 TO $150 A WEEK!

Agents coin tremendous profits. Going like wildfire. Sells for only $1.95. Liberal profits for agents. $10 to $25 a day easy; $200 to $300 a week possible.

WRITE FOR OUR FREE SAMPLE OFFER

You risk nothing. Don't delay. Write for money making proposition today.

NATIONAL INDUSTRIES, Wrigley Bldg., Dept. 158, CHICAGO

STOP THAT LEAK WITH SMOOTH-ON No. 1

YOU can apply Smooth-On with radiator full or empty, hot or cold, without removal from the car and without putting inside anything that clogs the circulation.

Merely roll the Smooth-On into a stiff putty, press it against and into the leak with your thumb or pack it into the defect with a knife blade or screw-driver, and scrape off the excess. The leak will stop instantly, and the repair is permanent. For a few cents and in a few minutes you will have avoided all the delays and expense of a professional repair job that couldn't be any better.

Bursted Water Jackets. Water jackets of automobile, stationary or marine gas engines which have developed long or short cracks or have even had pieces broken entirely out from freezing can be made thoroughly and lastingly serviceable by similar repair, or by applying Smooth-On under straps or a plate.

Smooth-On No. 1 can be used in a hundred ways in the household, and it often saves from $50.00 to $100.00 on the first job.

Keep a can of Smooth-On No. 1 with your tool kit and some day when caught with a repair job you will thank yourself for your forethought.

Get Smooth-On No. 1 in 7 oz., 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.

Write for FREE BOOK

FREE

This booklet tells how to stop not only water leaks in radiators, bursted water jackets, and at loose hose connections, but also how to stop gas leaks from the tank, gasoline lines and exhaust system, and oil leaks at gaskets and at cracks in crank or gear case. It also tells how to make headlight posts, nuts, hub caps and bolts and grease cups stay tight, and shows dozens of simple money saving Smooth-On repair jobs.

Sent free if you return the coupon

SMOOTH-ON MFG. CO.
Dept. 37, 574 Communipaw Ave.
JERSEY CITY, N. J.

Do it with SMOOTH-ON

SMOOTH-ON MFG. CO., Dept. 37,
574 Communipaw Ave., Jersey City, N. J.
Please send the free Smooth-On Repair Book.

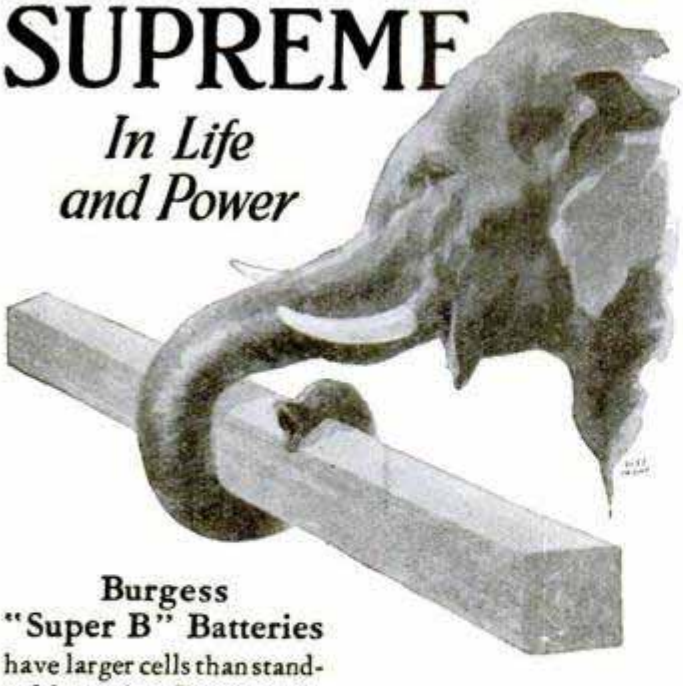
Name.....

Address.....

8-28.....

SUPREME

In Life and Power



Burgess "Super B" Batteries have larger cells than standard batteries. Extra power and life are thus provided. Uniformity is insured by scientific precision in manufacture. Radio's cost is lowered appreciably by the use of "Super B" No. 22308, a medium size heavy-duty 45-volt battery, designed for general, all around use . . . or "Super B" No. 21308, the largest size Burgess heavy-duty 45-volt battery, made especially for heavy-current consuming sets.

BURGESS BATTERY CO.
General Sales Offices: CHICAGO
In Canada: Niagara Falls & Winnipeg

Chrome

CHROME is a preservative that guards power when your Burgess "Super B" Battery is not in use. Extra life and service are thus added. It is a patented feature of the two Burgess "Super B" Batteries, which answer practically all radio set requirements.

BURGESS "SUPER B" BATTERIES

BR1 Elgin or Waltham movement, hand engraved 20 year guaranteed gold filled case. $2.12 a month. $26.50

Charge It By Mail

SENT FOR $1 NO C. O. D. TO PAY

Wear this standard American watch and take a full year to pay—Send $1 with order and this watch comes to you prepaid—no C.O.D. to pay on arrival

10 DAYS FREE TRIAL

FREE New catalog of genuine diamonds; Bulova, Elgin, Waltham, Hamilton, Howard, Illinois watches; fine jewelry. Write for your copy now.

A FULL YEAR TO PAY After examination and 10 day free trial, pay balance in 12 equal monthly payments. No interest. No extras. **All transactions strictly confidential.** You take no risk—satisfaction absolutely guaranteed or money back.

Established 1895

ROYAL DIAMOND & WATCH CO.
ADDRESS DEPT. 11-H, 170 BROADWAY, N.Y.

BIG MONEY MADE!

Our Salesmen-Agents make big money by "cashing in" on the unusual demand for Dickinson Tires which our National Advertising has created, Easy Sales! Write Today! We start you Free. Dept. 59.
HYDRO-UNITED TIRE CORPORATION, POTTSTOWN, PA. CHICAGO, ILL.

PLUMBING-HEATING

YOU SAVE HALF

FREE BOOK

Send for BIG FREE BOOK of Guaranteed Plumbing and Heating. Everything cut-to-fit. 50 yrs. in business. Thousands of customers. "You saved me $400.00," says Mr. Edw. Borkosky of N. J. Write today.
HARDIN-LAVIN CO., 107-17 C Pershing Rd., CHICAGO

GOLF SICKLE

WONDERFUL EXERCISE
CUTTING GRASS OR WEEDS
PATENTED
SENT $1.00 POSTPAID
GOLF SICKLE CO.
4139A McREE AVE. ST. LOUIS, MO.

Grid Leak Disturbances Eliminated

with the improved Bradleyunit-B Resistor

Eliminate grid leak noises and interference caused by inferior grid leaks by using the fixed Bradleyunit-B in your radio amplifier circuit. This solid molded unit is entirely free from these disturbances and will retain its rating indefinitely, regardless of voltage used. Unaffected by weather conditions. For best reception get one from your dealer today.

Allen-Bradley Co., 280 Greenfield Av., Milwaukee, Wis.

MODEL SHIPS

A dandy 30-inch sailing model construction set. Any schoolboy can build this model with our special construction set containing all ready-cut parts with full instructions. Just put together and a little trimming here and there and you'll have the slickest racing model you ever saw. Price $4.95 plus postage for 5 lbs. Everything but the paint. We can also supply model makers with construction sets and finished parts such as blocks, deadeyes, rigging lines, anchors, steering wheels, etc., for building scale models of Flying Cloud, Constitution, Mayflower, Spanish Galleon and many others. Large photographically illustrated catalog sent postpaid upon receipt of 10 cents.

MODEL SHIP SUPPLY CO., Dept. L, Mineola, N.Y.

Only a Buescher

Donald Clark *with his Buescher*

6 Days' Trial

in your own home on any Buescher Saxophone, Cornet, Trumpet, Trombone or other instrument.

Gives You All these Features

Patented Snap-on Pads—the greatest improvement for beauty of tone—easy to replace, no more cementing. Found only on the Buescher.

Patented Automatic Octave Key, always positive.

Perfect Scale Accuracy; every tone always full, clear and true.

"Greatest Sax"

Harry Dixon Loes, Three Rivers, Mich., wrote: "By the advice of a friend, I bought a Buescher Saxophone. I know now I made the right choice. Its beauty, easy action and latest improvements make it the greatest Sax on the market."

FREE BOOK

Illustrates all the various models, and contains pictures of many famous professionals—also first lesson chart. Send name for copy or ask for circular on any other instrument in which you are interested.

Buescher Band Instrument Co.
2570 Buescher Block Elkhart, Indiana

INDISPENSIBLE
for 100% Tube Efficiency

Only Amperite supplies automatically the self-adjusting filament current your tubes require. Eliminates hand rheostats. Simplifies wiring. Insist on Amperite. Accept nothing else. Price $1.10 complete. Sold everywhere. Write for Free Hook-Ups and construction data to Dept. P. M. 8.

RADIALL COMPANY
50 Franklin Street
New York City

AMPERITE
REG. U.S. PAT. OFF.
The **"SELF-ADJUSTING"** *Rheostat*

Sturdy steel Hoe, Rake and Trowel sent postpaid for ONLY **35¢**

You'll *Need* These at the Sea Shore!

JUST fine for beach or sandpile fun! Real tools—small enough for kiddies to handle easily, strong enough for actual gardening, handy to get in around the plants. Rigid steel, skilfully shaped to resist bending or breaking. Bright red wooden handles. This Kingsbury Floral Kit—rake, hoe and trowel—complete in 14in. colored gift carton, shipped postpaid direct to your seashore or country address for 35c. Order **now.** Kingsbury Mfg. Co., 83-N Myrtle St., Keene, N. H.

Over 15,000 Satisfied Users

SPRAYIT *Electrically*

$34.50 complete

Electric Sprayit is shipped complete ready to use—no accessories to buy—universal motor operates from either direct or alternating current. A small investment for great results.

• • Just Plug into any Electric Light Socket • •

—that's all there is to it. You don't have to invest in an expensive compressor and storage tank in order to have all the advantages of spray painting. The Electric Sprayit equips you with a practical, easily portable spray painting device.

Every manufacturer, shop man, contractor, plumber, building manager, etc., will find hundreds of uses for this handy labor-saving device, uses which will almost immediately repay the small investment.

Sprays any Finish

The Electric Sprayit sprays any finish, stain, or liquid preparation of proper consistency, including lacquers, enamels, bronzes, calcimine, whitewash, disinfectants, and even dry powders. Electric Sprayit is a proved product of merit now serving many thousands of enthusiastic users.

You can't afford to be without it. Order your Electric Sprayit today.

The Electric Sprayit Co. Inc.
320 Colfax Ave. E., South Bend, Indiana

THE ELECTRIC SPRAYIT COMPANY, Inc.,
320 Colfax Ave. E., South Bend, Ind.

☐ Send me an Electric Sprayit at $34.50, f.o.b. South Bend.

☐ Send me full information and guarantee on Electric Sprayit.

Name.....

Address.....

PM 8-28

Every "Up-to-Date" Boy Plays the Harmonica

VACATION days aren't half so much fun unless you can pull out a harmonica and show the crowd how you can play—or join with the other fellows in harmonizing the latest popular songs as well as the old-time melodies.

Everybody plays the harmonica *now*—that is, everybody who is up-to-date. Don't be the exception.

Send today for the free instruction book which will show you in pictures how you can learn to play the harmonica in an amazingly short time. A penny postcard will bring it free by return mail. Do it NOW before you forget!

FREE INSTRUCTION book, fully illustrated.

M. HOHNER, Inc.
114 East 16th St.
Dept. 508-H New York

HOHNER Harmonicas

USE ENGINITE FOR YOUR MOTOR COOLING SYSTEM

The Wonder Fluid

Applied through radiator. Gives pleasure to motorists. Prevents overheating. Removes rust, scale and corrosion scientifically. SAVES GAS AND OIL. ADDS PEP AND LIFE TO MOTOR. Non-injurious, non-inflammable. It is a preservative. Four treatments in one can, price $1.00 (West of Rockies 25 cents extra). Sent C. O. D. Postage prepaid. Guaranteed or money refunded. Reg. at U. S. patent office. Dealers write for proposition.

Manufactured by

INDUSTRIAL REFINING COMPANY
120 West 42nd Street NEW YORK CITY

"He Earns $25 a Day SELLING CAPS!"

Yes—I can remember the time he clerked at the bank for $25.00 a week. But now he makes big money, now he is his own boss, keeps his own hours, has a fine business. And he does all that by taking orders for amazing new cap—The Taylor Rainproof Made-to-Measure Cap. Last Saturday he took 53 orders in a box factory."

Amazing Rainproof Test Convinces All

We're talking about R. M. Lander of Michigan. But he's only one of hundreds who are making the biggest, easiest money of their lives with this fast selling line of Taylor Caps. Every man orders. All you do is pour water on the cap. Men gasp with amazement when they see the water roll off the surface, without wetting it. Absolutely rainproof. Wear the Taylor cap in rainstorms—it keeps perfectly dry, and keeps its smart new appearance. Positively the sensation of America.

Selling Outfit Now Free

Taylor caps are sold direct from maker to wearer at low factory price. Agents wanted in your community. You collect big commission in advance. Made-to-measure. Perfect fit guaranteed. 20 beautiful fabrics. Many new styles. Big new outfit just ready. We will send it to you absolutely FREE, if you rush your name and address to

Taylor Cap Manufacturers
Dept. 22-H Cincinnati, Ohio

SM

GETTING QUALITY IN RADIO RECEPTION

"The Secret of Quality" tells you simply and concisely how to get the most out of your amplifier—how to get quality. This 96 page booklet is yours for the asking—it's free. Write for your copy.

SILVER-MARSHALL, INC., 840 W. Jackson Blvd., Chicago, U.S.A.

6-TUBE RADIO COMPLETE
$34.75 to $66.66
Licensed R. C. A. Circuits. Shielded. One Dial
Write for catalog. Big discounts to agents
Consumers Radio Co., Dept. 168, 4721 Lincoln Ave., Chicago

SILVER ACE
NEW MODELS

fly 800 *feet*

STINSON · FAIRCHILD · RYAN CABIN TYPE

Wing spread 30 in. Weight 3¾ oz. Bright colors. Convertible Monoplane — Biplane — Seaplane. The new Silver Ace dummy whirlwind motor.

Deluxe (silk covered) Ready to Fly $12.50. Partly assembled $9.00. Knocked down $8.00. Extra pair covered wings $3.50. Silver Ace celluloid pontoons $4.00 a pair. Add 50 cents for shipping if your dealer cannot supply you.

Circular and price list of models, sets and supplies, 10 cents.

AERO MODEL COMPANY
329 Plymouth Court · Chicago

Ground Out Static

with SUB-AERIAL

Let Ground Waves Bring You Amazing Distance, Crystal Clear Tone Quality, and Greater Volume and Selectivity without Distortion.

Sub-Aerial has brought a new epoch in Radio. No need longer to bother with troublesome, overhead Aerials. Why risk breaking your neck to put up roof aerials only to have the first storm blow them down? Forget your Aerial Troubles. Why not use the whole earth as a static and noise filter with Sub-Aerial?

Costs No More Than an Overhead or Loop Aerial

and less than many. Hook your set on to the newly discovered Ground Waves that bring practically static free reception. Don't stand for the squawks and tin pan reception you get from Air Waves when you can step right out **and leave that stuff.**

If you don't believe us, try it yourself. If you do not find we're right—absolutely right—you don't pay us a cent for the test.

Can Be Installed in a Few Minutes

TRY IT FREE We know **so well** the surprising results you'll get that we'll let you put in a Sub-Aerial entirely at Our Risk. Don't take down your overhead Aerial. Pick a summer night when static and noise interference on your old Aerial are "Just Terrible." If Sub-Aerial doesn't **Sell Itself to You Right Then On Performance**—you needn't pay us a cent. Send for "all the Dope on Sub-Aerial." You'll be surprised. Do it NOW.

UNDERGROUND AERIAL SYSTEMS
St. Clair Building, Dept. 8-L
Cor. St. Clair & Erie Sts., Chicago, Ill.

MAIL THE COUPON

Underground Aerial Systems, Dept. 8-L,
St. Clair Bldg., cor. St. Clair & Erie Sts.,
Chicago, Ill.

Send me complete information on Sub-Aerial, Proof and Free Trial Offer. No obligation.

Name.....
Address.....
City.....
State.....

FREE RADIO BOOK!

40 pages chock-full of vital information for radio set builders. 14 new Aero circuits—receivers, transmitters, radiophones, short wave—fully described. Complete construction data, schematics, photos, etc. Exactly the book you've wanted. Write for **FREE** copy **TODAY.** Address

AERO PRODUCTS, Inc., Dept. 107, 1772 Wilson Ave., Chicago, Ill.

RADIO PANELS

BAKELITE—HARD RUBBER

Cut, drilled and engraved to order. Send rough sketch for estimate. Our complete Catalog on Panels, Tubes and Rods — all of genuine Bakelite or Hard Rubber. *Mailed on Request.*

STARRETT MFG. CO. 524 S. Green St. Chicago, Ill.

LYNCH

Leak-proof resistor mountings.
Single—35c. Double—50c.
Arthur H. Lynch, Inc., 1775 Broadway, N. Y. C.

SEND FOR BOOK

This 132 Page Radio Catalog and Encyclopedia

FREE

Containing 75 radio hook-ups, 500 illustrations, 1000 articles. Wholesale Prices

Build your own with Rasco parts. The lowest prices in the country.

Radio Specialty Company
98E Park Place NEW YORK, N.Y.

ENJOY the THRILL of ELECTRIFIED RADIO at SMALL COST

only $6.85 complete
FREE TRIAL

Banish forever all the annoyance and expense of buying new "B" Batteries with a TOWNSEND "B" POWER UNIT. Hooked up in a few moments—and you have permanent power from your light socket from that time on. Use same tubes now in your set. No changes needed.

You'll be amazed at the way Townsends improve your reception and add to distance getting. More than 50,000 now in use. Send coupon today for full information and free trial offer.

Townsend Laboratories, Chicago

COUPON

TOWNSEND LABORATORIES,
713 Townsend St., Dept. 15, Chicago, Ill.

Please send me full information on the Townsend "B" Power and Free Trial Offer.

Name.....

Address.....

Marvelous New Household Water Filter!

Your Health Demands Pure Filtered Water

Automatically Cleans Itself

NOW you can filter your own drinking water direct from your own faucet and drink PURE FILTERED WATER. This Marvelous Invention filters all the drinking water you want INSTANTLY and clears the waste matter AUTOMATICALLY when the opposite faucet is used.

Protect the Health of Your Family from Your Own Faucet!

The water in every home should be filtered, because good health demands pure water and the more pure filtered water we drink the healthier our bodies will be. The cost of this wonderful filter is too small to overlook its importance in the home for the family. Its value has been proven in a great many homes and endorsed by Health Authorities. Pure water in the home is the BEST DOCTOR.

No Trouble—Nothing To Adjust—Easy To Install

There is nothing complicated or anything to get out of order and is simple and easy to install and is ready for use instantly. It is worth its weight in gold in your home and we also offer you a real money-making proposition to deliver to other homes in your locality. WRITE TODAY!

ENDORSED By the Health Department of the City of Chicago.

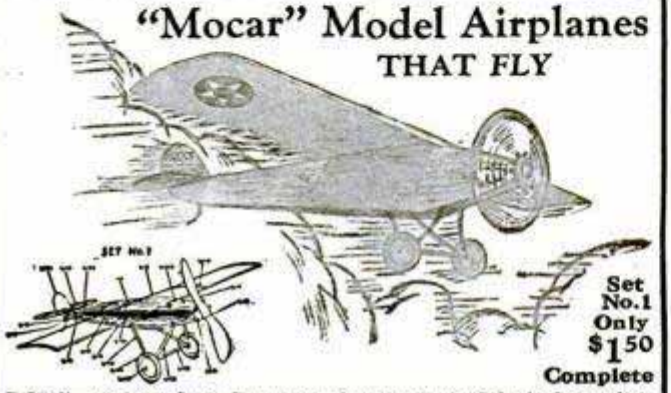
Complete Only $10

AGENTS Wanted in Every Locality

Read Write-Up in POPULAR MECHANICS (March) Page 386.

DENZ STONE WATER FILTER CO. 2241 W. 21st St. Dept. 50 CHICAGO, ILL.

"Mocar" Model Airplanes THAT FLY



Set No. 1 Only $1.50 Complete

BOYS—at last, here is a real aluminum model airplane that **really flies.** And at a small price.

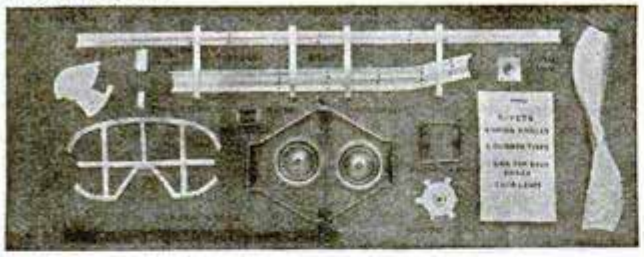
The "Mocar" monoplane—Set No. 1—is a copy of the famous Spirit of St. Louis. Wing spread 18 inches, fuselage 12 inches, powerful motor, ball bearing propeller, rubber tired disc wheels. Weight complete only about 2½ oz.

This is a practical, simple, real model plane that gives you a whole lot of fun for the moderate cost. The all metal construction makes a sturdy plane that will stand a lot of abuse. The outfit is mounted on cardboard with all parts plainly marked and full instruction for assembly. Pliers only tool necessary. Complete with rivets, bolts, nuts, wheels, wing and fuselage covering material, only $1.50 post paid anywhere in U. S. A. (3 for $4.00).

Great fun, learn how to make and fly airplanes. *Order now.*

Jobbers, dealers and schools write for net prices.

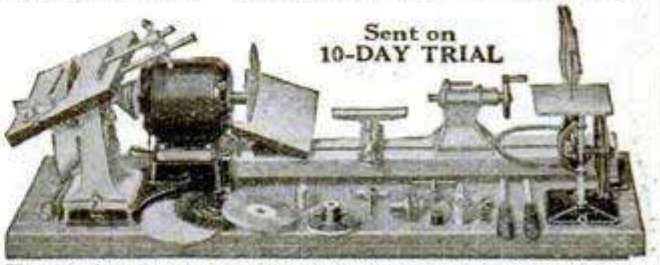
The illustration below shows set mounted complete ready for assembly. Small cut above shows all metal skeleton ready for covering and the large illustration, actual cut of finished plane.



THE MOUNT CARMEL MFG. CO.

Dept. M MOUNT CARMEL, CONN.

DELTA HANDI-SHOP



Here's a big, husky, practical workshop with a two-shaft motor so that as many as three tools are always ready for work. Every one of the many accessories is full-sized—every one a nationally known product. There is no other workshop that offers so much actual machine-value per dollar. Send for illustrated color folder describing Delta Handi-Shop. Also full details of Free Trial Offer, Easy Payment Plan, and FREE Blue Prints. No obligations. Write today.

DELTA SPECIALTY CO., Dept. M. P. 828, 858 3rd St., MILWAUKEE, WIS.

Any Band Instrument FREE TRIAL

Saxophone, cornet, trumpet, trombone, clarinet, flute — choose any Conn instrument for band or orchestra; *try it in your own home FREE. Easy payments* if you decide to buy.

With Conn's easy-playing features, you make quick progress. Take your place in a band or orchestra after a short period of pleasurable practice.

Send for Free Book, illustrating and describing instruments, and details of free trial offer. Mention instrument interesting you.

C. G. CONN, *Ltd.*
831 Conn Bldg. Elkhart, Ind.

CONN BAND INSTRUMENTS
WORLD'S LARGEST MANUFACTURERS

the Drill of many Uses

C-O Utility Drill

The Makers of the famous C-O Garage Tools and Equipment, known the world over, offer you a Utility-Drill complete, ready for the job, for ONLY $34.00.

Not an attachment nor a makeshift, but a real drilling machine designed by master engineers.

Here's real drill value — just read these specifications: Vertical type motor, 110 volt, 60 cycle, single phase, AC, with cord and switch; belt drive; 3-jaw chuck; 11x6" bench space; 23" high; weight 62 pounds.

Bores holes up to ½"; works in 9" circle; 2½" up and down spindle run; 7½" range on column; 1100 to 2200 spindle speed.

Ideal for garages, repair and service plants, factories, all mechanics and farm and home craftsmen.

Also furnished in other voltages and cycles. Prices on request. Order today or if you need more information write for circular.

ONLY $34.00 COMPLETE WITH MOTOR

FULLY GUARANTEED

CANEDY-OTTO MFG. CO.

Dept. PM. Chicago Heights, Ill.

Licensed by Rider Radio Corporation. Patented 5/2/'16, 7/27/'26. Patents Pending.

Controls That Meet Every Test

Electrad Resistances are the product of one of the oldest and largest parts manufacturers. They are the choice of leading radio authorities and circuit signers—the standard by which others are judged. Ask for and be sure you get genuine Electrad controls.
Electrad specializes in a complete line of Resistances for all Radio Purposes.

Exclusively Licensed by Technidyne Corporation. Under U. S. Patent No. 1593658, 1034103, 1034104.

PHASATROL
Reg. U. S. Pat. Off.

A True Balancing Device for Radio Frequency Amplifier

An unusually efficient device for controlling radio frequency oscillations and thus eliminating disturbances to reception. A wonderful improvement for the new A. C. circuits where the elimination of oscillation is a problem. Price $2.75 each.

TONATROL

Complete Line of Volume Controls

Smooth, gradual control of intensity under all conditions will be your reward if you incorporate the Tonatrol Volume Control in your receiver. Furnished in standard types, or with filament switch or power switch attached. From $1.50 to $3.00.

Tear out and mail coupon for complete FREE circulars and information

Electrad, Inc.,
Dept. F-8, 175 Varick Street,
New York.
Please send me descriptive circulars on the following products and put me on your mailing list for similar literature.
——General Circular
——Tonatrol Volume Controls
——Phasatrols
——Royalty Variable Resistors
——Truvolt Divider Manual (Enclose 10c for mailing)
——"Electrad Control Manual" (Enclose 10c for mailing)
——"What B Eliminator Shall I Build?" (Enclose 10c for mailing)
I am particularly interested in
.....
.....
.....
Name.....
Address.....
.....

ELECTRAD Inc.

"H&A," the Better Wood Lathe

WRITE FOR PRICES ON
SAW TABLES
BAND SAWS
SWING SAWS
JOINTERS
SCROLL SAWS

MOUNTED on heavy structural steel bed—vibrationless, accurate, perfectly balanced—a wonderfully fine tool at modest cost. Made with 3, 4 or 5-foot bed; complete home shop accessories furnished. Write for details.
HESTON & ANDERSON, 608 Western Ave., Fairfield, Ia.

Start to Play Very First Day

Be the life of the party. Xylorimbists make *$5 to $25* a night. No knowledge of music required. Wonderful for home. Free, easy lessons; five days' trial; a year to pay.
Send Coupon for BIG FREE BOOK!

J. C. Deagan, Inc., Dept. C-145 1770 Berteau Ave., Chicago
Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.
Name _____
Address _____

AGENTS

Make big earnings, taking orders for made-to-individual measure suits at less than ready-to-wear prices. Giant Chicago wholesale house makes world's greatest values at $23.50 and $29.50. Your profit $4 and $5 per sale in advance—we deliver and collect. No experience needed, work full or part time.

FREE OUTFIT Send no deposit. Write for details of our unique money-making plan. Nothing like it ever before offered. Act at once.

GENERAL TAILORING CO., DEPT. 8A, 529 South Franklin St., Chicago

MAKE A MOTORCYCLE

OUT OF YOUR BICYCLE with a STEFFEY MOTOR ATTACHMENT. RELIABLE—ECONOMICAL—EFFICIENT. Easy to attach. Fits any wheel. **Send 10 cents for circulars.**

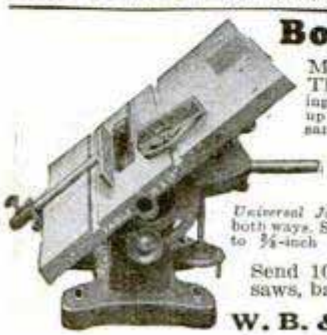
STEFFEY MFG. CO., Dept. P, 3924 Fairmount Ave., Phila., Pa.

QUICK, EASY PROFITS!

Practically no investment. Small space required. Steady demand and BIG PROFITS refinishing autos, furniture—painting houses and barns with HB quick spray method. One man does the work of five with brushes. Pays for itself on easy monthly payments. 30 DAYS' TRIAL. Write today for details.

HOBART BROS. CO. Box M882, Troy, Ohio

Boice-Crane Machines for Real Mechanics

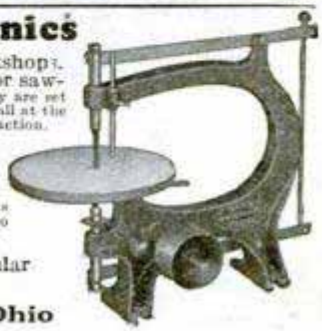


Mechanics who KNOW machinery choose Boice-Crane machines for their workshops. They appreciate the tremendous advantages of individual machines—a saw for sawing, a lathe for turning and a jig or band saw for fancy curves. Once mounted on your bench they are set up for good and ALWAYS ready for work. You waste no time changing attachments. Use one or all at the same time. The Boice-Crane costs no more than "combination" types but gives ten times the satisfaction.

Boice-Crane's ideal workshop is made up of the universal handsaw and universal jig saw shown here and an 8-inch lathe. A full 1–3 h. p. double shaft motor provides plenty of power. Get a Boice-Crane which thousands of real mechanics the world over are using.

Universal Jig Saw. Table 8-inch dia. tilts 45 deg. both ways. Saw-to-frame 10 inches. Uses blades ⅛-inch to ⅝-inch wide.

Universal Handsaw. Elevates for grooving. Cuts 2½-inch stock. Insert takes 6-inch x 1-inch dado head, cope heads and 8-inch sand disc.



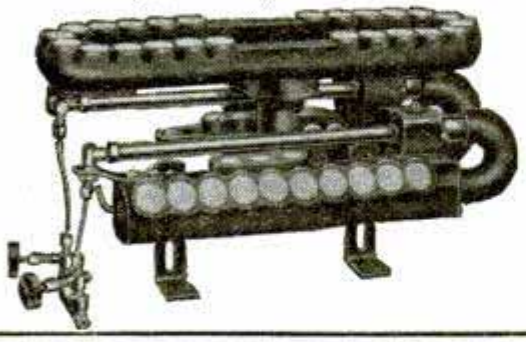
Send 10c for new catalog "B" describing the complete line of Boice-Crane circular saws, band saws, jig saws, lathes and jointers.

W. B. & J. E. BOICE Dept. PM. 8-D Toledo, Ohio

"The Wonder of the Age"

OXO-GAS BLUE FLAME OIL BURNERS

Burn Gas Made From Kerosene (Coal Oil) and Air



Will Heat Stoves, Ranges, Coffee Urns, Steam Tables, Tanks, Boilers, Vulcanizers, Water Coils, Rendering Kettles, Bake Ovens, Griddles, Lead Pots, Pressing Machines, etc.

No Noise—No Smoke—No Soot—No Ashes
Require No Mechanical Skill to Operate
Can be Installed in 30 Minutes
Last a Lifetime

Responsible Distributors Wanted

Write for illustrated catalog.

GLORIA LIGHT COMPANY
111-8 No. May St. Chicago, Ill.

ONLY $1.00 Down

10 Day FREE TRIAL

Never has there been such a TYPEWRITER BARGAIN on as EASY TERMS. A **genuine** SILENT Ball Bearing L C Smith—GUARANTEED 5 YEARS—at a 50% saving. Here's your chance to get the best typewriter money can buy for only $1 down. Act now—save ½!

World's Only Ball Bearing Typewriter

Because of its ball bearings and other exclusive features, the L C Smith has for over 20 years been recognized as the world's finest, easiest running, longest wearing typewriter. U. S. Government purchases over 50,000. It is also the choice of railroads, big corporations like the Standard Oil Co., etc. All the latest operating attachments; beautifully re-newed; fully guaranteed.

$3 Worth Extras FREE

Don't buy any typewriter until you have tried an L C Smith. For the sake of your future satisfaction, accept our FREE TRIAL OFFER. Use the ball-bearing L C Smith 10 days before deciding on any machine. By acting now you get Tools, Waterproof Cover, valuable Home Study Touch Typewriting Course FREE. Write today for details of our Special $1 Offer and Free manual of typewriter information.

SMITH TYPEWRITER SALES CORP.
118-360 E. Grand Ave. CHICAGO

$50 Every Saturday

IN ONE MINUTE
Ten of these sensational demonstrations a day will pay you $150 a week. No experience necessary—we show you how.

MAKING AMAZING DEMONSTRATION

I mail pay-checks every Saturday to men I appoint in every territory. Work full or spare time making amazing demonstration that will save prospects thousands of dollars.

Demonstrator Furnished

We will furnish outfit for sensational demonstration. No investment for stock—no deliveries or collections. Every one a prospect. Show in homes, stores, garages, schools, offices, and to farmers, etc. Many of our men now making $300 to $600 a month. Write at once to

FYR-FYTER COMPANY
90-H Fyr-Fyter Bldg., Dayton, Ohio

Photos ENLARGED

Size 16x20 inches
Same price for full figure or bust, groups, landscapes, or pet animals, etc., enlargements of any part of group picture. Safe return of your own original photo guaranteed. **98c**

SEND NO MONEY Just mail photo or snapshot (any size) and within a week you will receive your beautiful life-like enlargement size 16x20 in. guaranteed fadeless. Pay postman 98c plus postage or send $1.00 with order and we pay postage. With each enlargement we will send FREE a hand-tinted miniature reproduction of photo sent. Take advantage now of this amazing offer -- send your photo today. **SPECIAL FREE OFFER**

UNITED PORTRAIT COMPANY
1652 Ogden Ave. Dept. 36B. Chicago, Ill.

Ford Owner Stop that ruinous chatter on your car. MAKE THIS TEST—take out your floor boards, pull your emergency brake back and forth. If you notice play at the ball joint, you need Bredar's Rail Shim. Price $.50. Ask your Dealer or order direct. Demand Bredar's Shim.
NIC BREDAR'S SON MFG. CO., Rock Island, Ill.

FREE BULLETIN

Speed Up Your Jobs with Crescent Woodworking Machines

You can perform all wood working operations more quickly and accurately than by hand with Crescent Wood Working machines. Dependably built, handy, portable, operate from any lamp socket. Write today for description of the 6-inch Bench Jointer illustrated here. Free Bulletins on Cut-Off Saws, Shapers, Borers, Universal Wood Workers, Planers, etc., all electrically operated.

THE CRESCENT MACHINE CO.
93 Columbia St. Leetonia, Ohio

SIDE LINE

Sold to Rated Trade Only

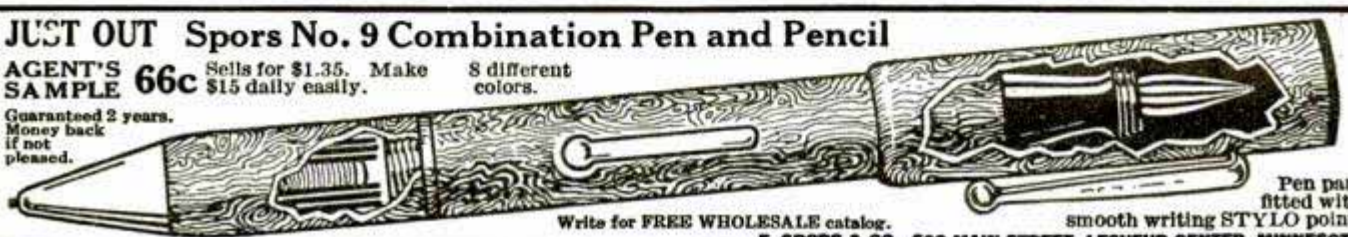
For use in their own building. Sold from Pocket Portfolio: 30 day trial when requested. Removes stoppages from waste pipes. Give full information about yourself in first letter. Replies confidential.

J. E. Kennedy Corp., Dept. 4-E, 79 Madison Ave., New York

JUST OUT Spors No. 9 Combination Pen and Pencil

AGENT'S SAMPLE 66c Sells for $1.35. Make $15 daily easily. 8 different colors.

Guaranteed 2 years. Money back if not pleased.



Pen part fitted with smooth writing STYLO point.

Write for FREE WHOLESALE catalog.
F. SPORS & CO., 628 MAIN STREET, LESUEUR CENTER, MINNESOTA

Heats Home for 25¢ a Week!

"I can run my Bulldog furnace steady for fourteen days in normal weather conditions on the actual cost of fifty cents." So writes F. R. Redetzke, of Cleveland, North Dakota, and he adds: "Hard to believe is it? That's what some of my neighbors thought until I showed them! We have an unlimited amount of grain screenings in this country. That's the fuel I am using."

That's what the Bulldog does with about the lowest grade fuel you can think of! Here's what it does with coal:

After 6 Years—"Heats as Good as Ever"

"Our furnace has been in use 6 years and heats as good as ever."
—Arthur Cloepfil, R. F. D. No. 1, Rockport, Mo.

"Does the Work of 3 Stoves"

"This is my third winter with the Bulldog. It does the work of 3 coal stoves that I used, which only warmed up part of the house and not very well at that. My Bulldog not only does that, but 3 rooms upstairs, with great satisfaction. My house is located in a very cold place, with no protection at all. It is the easiest furnace to handle I have yet seen." E. C. Diplock, 105 Elm St., Camden, Me.

Cuts Coal Bill in Half

"I had a hot air furnace in our 7-room house before I got the Bulldog and our house was always cold. With the Bulldog it only takes *half as much coal* and we had weather below zero, and the house was nice and warm in the morning when we got up. We never have the draft on more than half an hour at a time, and it has the place red hot. It keeps the fire all day in mild weather."
—Jess T. Conrad, 1211 W. Arch St., Shamokin, Pa.

No Money Down!

Small Monthly Payments—Installed Almost as Easily as a Cook Stove!

The Bulldog is sent to you for *free inspection.* Then, if satisfied, you make only small monthly payments at our remarkably low price. Write today! *Don't* miss this chance to cut down your fuel bills! *Install a Bulldog Furnace.* It comes to you completely erected — goes through any door — fits any height of basement — and you install it yourself in less than two hours! In fact, you can install the Bulldog just about as easily as you would a kitchen stove. *Don't* put up with the old fashioned stove heat or some outworn furnace — when you can so easily get the greatest advance in scientific heating at an astonishingly low price The Bulldog burns almost *any* kind of fuel, from hard coal to cheap screenings. Keeps a wood fire over night. **We have factory connections in both east and west and ship from the nearest point.**

Send for Free Book

Learn how to have all the heat you want—where you want it—and save money! Remember the Bulldog is *different* — and *better!* Complete combustion of gases save 25% of your fuel bill. Exclusive Gable-Top Radiator receives *all* the direct rays of the fire. Exclusive oblong fire-pot is not only ideal for coal, but enables you to keep a wood fire over night. Remember—the Bulldog is sent for *free inspection*—then small monthly payments at an amazingly low price! Send for Free Book TODAY!

BULLDOG FURNACE CO.— *Babson Bros. Sole Distributors*
19th Street and California Ave. Dept. C-135 Chicago, Ill.

Bulldog Furnace Co., *Babson Bros. Sole Distributors*
19th St. and California Ave., Dept. C-135 Chicago, Ill.

Without obligating me in any way, please send me your free catalog and special offer on the Bulldog Furnace.

Have you a basement? *Yes* ☐ *No* ☐

Name .....

Address .....

.....

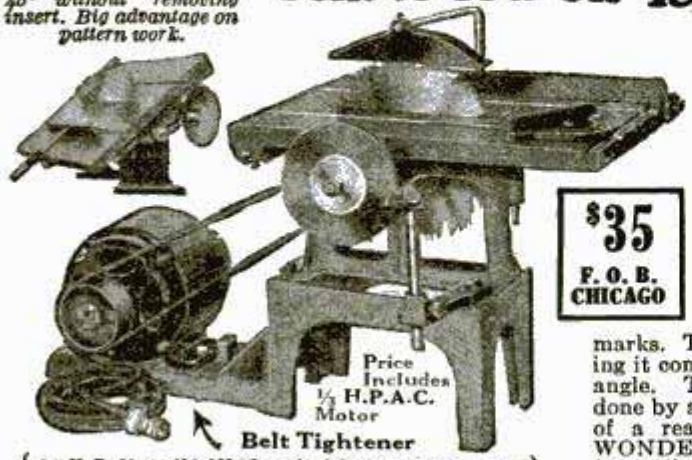
18 Tools In One 8" Combination S&B SAW

Money Back Guarantee

12" Band Saw

The only machine that you can tilt the table to 45° without removing insert. Big advantage on pattern work.

Sent to You on *15 days approval*

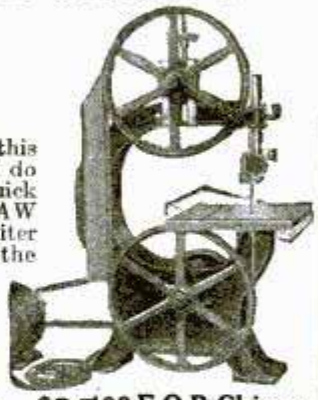


{ ⅓ H. P. Motor-40°-100% overload Double Shaft Extension }

$35 F. O. B. CHICAGO

12" Band Saw

Positively a sensation and at this LOW PRICE you can NOW do the 1001 things you wanted quick and easy. This 12" BAND SAW has a tilting table, with Miter and sturdily built. Ideal for the shop or home.



$35.00 F.O.B. Chicago without Motor

S&B Scroll Saw

Here is the outfit of practical usefulness. Will cut wood and light metal true to marks. Table top tilts to 45 degrees, making it convenient and easy to cut at proper angle. Thousands of jobs can NOW be done by any man or boy with the accuracy of a real mechanic. This S&B WONDER SCROLL SAW is free from vibration.

Scroll Saw

$15.00 F. O. B. CHICAGO ⅓ H. P. A. C. Motor $15 extra

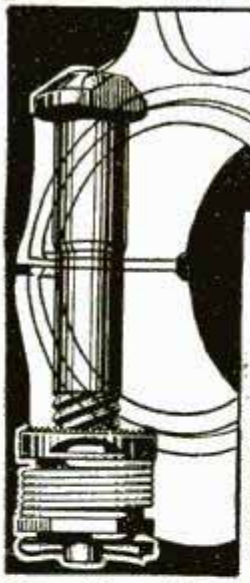
18 Tools in One—Greatest Machine You Ever Saw

THE S&B 8-in. COMBINATION SAW (18 tools in one) is the ideal machine for the shop, factory or the home; will rip, cross cut, bevel, miter, mortise, groove, drill, tenon, grind, rabbet, buff and polish. Motor is mounted on a base that is a part of the machine proper. Run from any light socket, also provides power for other purposes when the saw is not in use. Complete with attachments and price includes 1-3 H. P. Motor, 60-cycle, 110-Volt A. C. Price $35.00 F. O. B. Chicago. Shipping Weight 100 lbs.

(Planer attachment to fit on table top will smooth pieces up to 2 in. wide, $10 extra.)

SCOTT-BANSBACH MACHINERY CO.
130 So. Clinton St., Dept. 82, CHICAGO, ILL.

Write for Complete Illustrated Folder—Dealers Wanted.



SAVE REPAIR BILLS

No More Bearing Expense - on Ever-Tite Bolted Motor

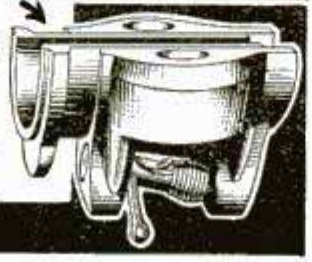
Install EVER-TITE BOLTS on your connecting rod bearings and end all knocks for the life of the motor—Stop all future work and cost of tightening worn bearings. Even on out of round crankshaft EVER-TITES work perfectly, eliminating expensive regrinding jobs. The automatic feature keeps bearings snug and true at all times. Anyone can install them in a few minutes. 50,000 miles guaranteed or money refunded. On the market 7 years giving satisfaction.

Size Chart Free

Made for all cars, trucks and tractors. Set of 8 for Ford "T," Chevrolet 1925-28 and cars using 3-8-inch bolts, $3.75 (prepaid). Send order or write for size chart and complete information on how to cut repair bills and eliminate engine worries.
Insist upon the original and genuine EVER-TITE.

Stops Crank-Shaft End-Play Trouble

This device automatically rids Fords and Chevrolets of motor ills caused by crankshaft end-play without pulling motor. Keeps pistons in perfect alignment, saving entire motor construction. Also aids easy starting. For Fords $3.50, Chevrolets $4.00. Send for circular. Install the EVER-TITE Self-Adjusting Center Bearing Cap.



EVER-TITE BOLT CO.
4752 Sheridan Rd.
CHICAGO, ILL.

If You Own a Car~You Can Obtain 30 Days Demonstration FREE!

NEW SPARK PLUG

Famous new Lynamite Spark Plug saves $2 out of every $10 spent for gas. Vacuum Transformer Chamber produces big blue-white spark, many times stronger than ordinary faint red spark. Fires at 200 pounds compression. Gives 15% more power. Fires 20% leaner mixture. Prevents carbon. Fires thru oil. Gets you over hills. Sturdily built for lifetime use. Eigholz, Cal., writes: "Over 30,000 miles without a miss." Three million already on cars.

SEND IMMEDIATELY

Just state make and year of your car and number of cylinders. Complete set **Lynamite** Plugs will be sent absolutely **Free.** State if liberal Agents' Proposition should be included. Use 30 days entirely at our expense. See what amazing results you get and then either send $1 for each plug or return to us. You risk nothing, so send now—TODAY—to

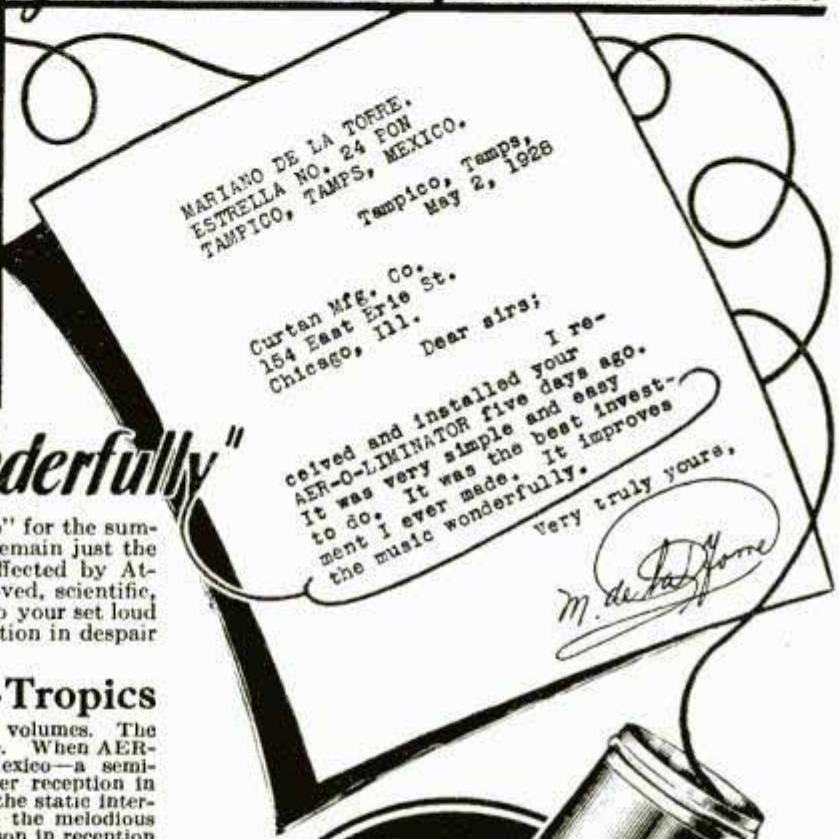
Dept. 805-L
LYDON MFG. CO.
180 N. Wabash Ave., CHICAGO

Agents

Also be sure to send for full particulars of a new Direct Selling Plan that has no equal in the field.

Amazing Ground Antenna

Gets Winter Reception in Summer



"Improves Music Wonderfully"

It is no longer necessary to say "Good-Bye Radio" for the summer. Science says that clear, pure ground waves remain just the same during the summer months. They are unaffected by Atmospheric conditions. Aer-O-Liminator is the proved, scientific, successful means of bringing these ground waves to your set loud and clear, while others are giving up summer reception in despair because of maddening, music-destroying static.

Proof Comes from the Semi-Tropics

The letter from Mexico reproduced above speaks volumes. The Spanish are great music-lovers and are trained to judge. When AER-O-LIMINATOR improves music wonderfully in Mexico—a semi-tropical climate—you know it literally gets "Winter reception in summer." Distant Stations formerly drowned out by the static interference of noisy air-waves now come in clear and with the melodious tone of a bell. Winter or Summer, there is no comparison in reception with Aer-O-Liminator and without it.

Engineer Recommends AER-O-LIMINATOR to Every Radio Owner

Reception on any type receiver is improved with the use of Aer-O-Liminator. This has been proved countless times on both D. C. and A. C. sets. John E. Christensen, Chicago Radio Engineer, says: "I have tested and thoroughly approve the 'Aer-O-Liminator.' I find it increases selectivity and volume without distortion, eliminates static, gives good, clear tones, both on LOCAL and DISTANT stations. I would recommend the use of Aer-O-Liminator to every radio owner to get the best reception from his set.

Send Coupon for Free Trial

Install an Aer-O-Liminator (Ground Antenna). Leave your old overhead aerial up. Try out on a night when static is bad. If you do not get a wonderful improvement in freedom from static, greater selectivity and clear, sweet tone without interfering noises, if you can't get good reception on stations that are drowned out by static on your roof aerial, you need not pay us a red cent for this test! Send coupon at once for scientific explanation of Aer-O-Liminator (Ground Antenna), proof of performance, and our conclusive iron-bound guarantee and remarkable Free Trial Offer—Mail Coupon TODAY!

CURTAN MFG. COMPANY
Dept. 805-L. A., 154 E. Erie St., Chicago, Ill.

Aer-O-Liminator
(Ground Antenna)

USE THIS CONVENIENT COUPON TODAY

Curtan Mfg. Company
154 E. Erie St., Dept. 805-L. A., Chicago, Ill.
Please send me at once complete description of Aer-O-Liminator with details of Guarantee, Scientific Proof, and Free Trial Offer

Name.....

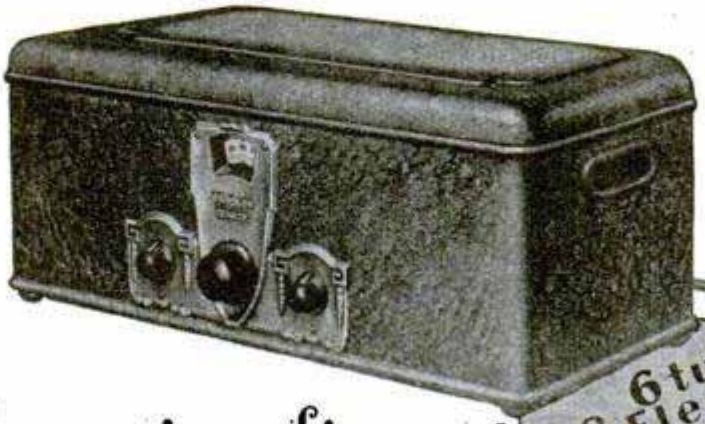
Address.....

City.....

State.....

CROSLEY

New Dynamic Speaker **DYNACONE** $25



The first AC set of any type ever offered at so low a price. Highly selective; coils shielded; illuminated dial; genuine Neutrodyne; powerful, efficient, proven!..$65

6 tube AC Electric **GEMBOX** $65

The crowning achievement in a history of successes!

Features of the 1928-29 Crosley Radio Receivers

Genuine Neutrodyne radio amplification.

Complete shielding which adds so greatly to the amazing selectivity of Crosley receivers.

Full voltage delivered to the plates of the tubes.

A sensitivity that delights the "old" radio fans and thrills the new ones by the ease with which weak distant stations are brought in.

Positive volume control reduces volume without detuning set.

Adaptability to any type of console.

Modern illuminated dial eliminates the annoyance of shadows, searching for lights in the dusk, etc.

Here, in a new line of radios for the season of 1928-29, Crosley presents VALUE such as Radio has never seen. . . . an engineering triumph in **quality** . . . . a production miracle in **price!**

Crosley represents fine radio—perfect performance and utmost enjoyment of broadcasting at seemingly impossible prices.

These values are yours today because of the powerful advantages gained through study, work and development acquired in the Herculean task of building and selling nearly two million pieces of radio apparatus.

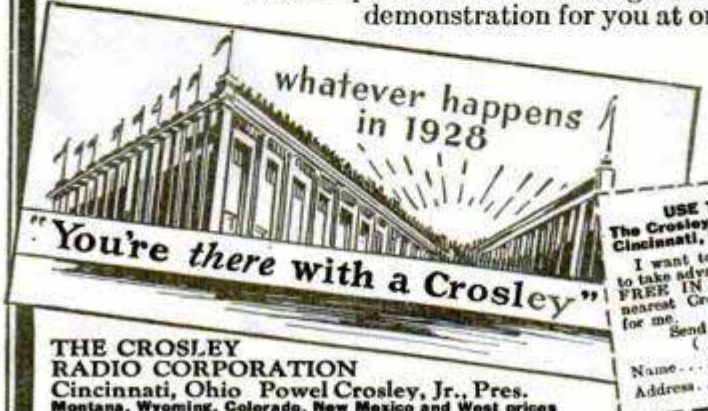
Satisfied by laboratory and actual home installation comparisons that Crosley radio has NO equal Crosley NOW makes it possible for every prospective radio owner to know how well Crosley radio will perform in his or her home before they buy.

5 Days' FREE Trial In Your Own Home

This is the NEW way . . . . the CROSLEY way to buy radio. First advertised nationally by Crosley last April.

Study the sets shown at the right. Then go to the nearest Crosley dealer. Ask for a FREE trial.

Over 18,000 Crosley dealers serve the United States, but if you cannot locate one near you send us this coupon and we will arrange a home demonstration for you at once.



THE CROSLEY RADIO CORPORATION
Cincinnati, Ohio Powel Crosley, Jr., Pres.
Montana, Wyoming, Colorado, New Mexico and West prices slightly higher

The 8 Tube AC Electric JEWELBOX
Genuine Neutrodyne; full 180 volts on output tube plates; 2 171 output tubes, push pull. Illuminated dial; Acuminators.....$95

The 8 Tube AC Electric SHOWBOX
A new completely shielded genuine Neutrodyne; illuminated dial; full 180 volts on the plates of 2 171 output tubes, push pull.....$80

The 6 Tube Improved Battery type BANDBOX
Proven star of Crosley radio—Neutrodyne; shielded; illuminated dial; Acuminators; unequalled in its field..$55

The 5 Tube Dry Cell Operated BANDBOX Jr.
Modern reception for places where electric current is not available or storage battery recharging is inconvenient $35

DYNACONE $25 **MUSICONE $15**

New amazing dynamic DYNACONE reproduces every note audible to the human ear with remarkable fidelity, naturalness and realism.

The famous Musicone still leads the world as its greatest magnetic type of speaker.

USE THIS COUPON FOR FREE TRIAL
The Crosley Radio Corporation
Cincinnati, Dept. 15

I want to know more about Crosley Radio. I want to take advantage of your offer to let me try one 5 DAYS FREE IN MY OWN HOME. I cannot locate the nearest Crosley dealer so please arrange a demonstration for me.

Send Set ( ) Send literature ( )

Name.....

Address.....

"Every 3,000 Miles This Amazing Little Device Buys Me a New Tire...FREE"

"THE money I save on gasoline more than keeps me in new tires. Figure it out . . . I was getting 13 miles per gallon on my Nash. With gas at 18c plus 2c tax it cost me $46 to drive 3,000 miles. Now I'm getting better than 26 miles per gallon. It takes just half the gas and I save $23 to $25 every 3,000 miles—more than the price of a new tire."

No matter what make of car you drive, the Stransky Vaporizer is unconditionally guaranteed to give you 50% to 100% more miles per gallon or it costs you nothing. As a matter of fact, it is not uncommon for the Stransky Vaporizer to more than double gasoline mileage!

Note These Records

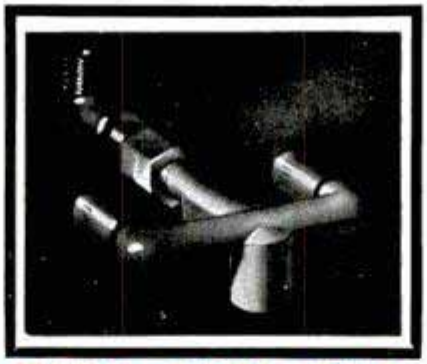
Forty-three miles per gallon from a Chevrolet, reported by F. S. Carroll. Fifty-seven miles on one gallon in a Ford, reported by J. T. Jackson, Michigan. Forty miles per gallon in a Dodge from Brownsville, Tex., to Tampico, Mex., reported by T. L. Brown.

Proved by Two Million Owners

Records like these are reported in every mail for every make and model car . . . from 72 different countries . . . the world over. More than two million Stransky Vaporizers have been installed.

43.8 Miles Per Gallon

Mr. M. E. Miller, Kansas City, writes: "You people claim a saving of 25 to 50% of Gasoline. I have subjected the Vaporizer to a severe and thorough test. After installing one on a Chevrolet, I found I was obtaining 43.8 miles to a gallon whereas formerly I had been getting only 19.5. That is not a saving of 25 to 50% but 124%, so you see that the actual test surpasses your claim."



FITS ANY CAR IN 5 MINUTES

Anyone can install this device in 5 minutes. Simply loosen one connection to the intake manifold with a wrench. You can do the rest with your fingers!

Easily Installed

No bigger than a dollar coin —no more expensive than a good wrench—no more trouble to attach than a fan belt! Attaches to the intake manifold of any car in five minutes. Anyone can do it.

Less Gasoline— More Power

The Vaporizer supercharges your gasoline after it leaves the carburetor. Completely vaporizes the gasoline. Under this ideal condition you get more compression out of less gasoline and a more complete explosion. Both power, pickup and speed are noticeably increased. Starting is not interfered with, as the Vaporizer automatically shuts itself off when the motor is idle.

Make This Test

Test the Stransky Vaporizer on your car—and expect results that will amaze you! Double your mileage—get flashing pickup and power —forget carbon troubles, sluggish motor and fouled spark plugs from over-rich mixture and save enough on your gasoline to more than keep you in tires. These results are guaranteed or the test costs you nothing.

Mail the coupon below for full details, guarantee, and amazing trial offer, which is even more remarkable than we can tell you here. There is no obligation whatever.

$4 an Hour for Salesmen, Agents, and Spare Time Workers

Men are making wonderful earnings showing the Stransky Vaporizer to car owners in spare time and full time. Sells fast under our guarantee. Foster made $357 in two weeks. G. F. Fuller earned $114 in 5 days. Eberlein sold 23 Vaporizers in 35 minutes! J. W. Cronk actually earned $51 in an hour. You should be able to earn at least $3 every hour you put in. We offer demonstrators one Vaporizer FREE, under our unusual offer. Get full details. Simply mail coupon at once.

J. A. STRANSKY MFG. CO.

K-10 Stransky Block, Pukwana, So. Dakota

J. A. Stransky Mfg. Co., K-10 Stransky Block, Pukwana, So. Dakota.
Without obligation send me full details of your free trial offer.

Name.....

Address.....

City.....State.....

( ) Check here for Distributor's Sample Offer and the selling plan.

A Million Dollar Can Opening Machine!

Brand New Invention BRINGS FORTUNES TO AGENTS

Here's Something Brand New! An Amazingly Simple Invention—Yet Absolutely Revolutionary! For Now, At One Sweep, Millions of Old Style Can Openers are Doomed to the Scrap Heap! Think of It, Men! A Tremendous New Opportunity for Quick Profits in Every Home in America! No Wonder Agents Are Making Astonishing, Almost Incredible Sums—$75, $100, $150 a Week Easily Right Along. So Mail the Coupon for All the Facts and Full Details of My Remarkable FREE TEST OFFER!

ABOUT once in a "blue moon" some genius pops up with a new invention that everyone has been waiting for. Then, presto! Almost like magic, agents' profits go soaring overnight to tremendous heights! And now the cold, hard-boiled facts about this amazing new can opener bear convincing proof!

More Than a Can Opener

This queer new device doesn't just cut a ragged hole around the edge of the can. It lifts the entire top completely out, clean as a whistle! The machine holds the can—opens it—flips up the lid so you can grab it—and gives you back the can without a drop spilled, without any jagged edges to hack your fingers—all in a couple of seconds! You just put the can in the machine—turn the handle—and almost instantly the job is done! Built to do the job better than anything ever devised! Will last a lifetime! It's far more than just a can opener, it's a real **can-opening machine!**

The Secret of Big Money

Women hate the old style can opener—and with good reason, too. It's the last relic of barbarism in the modern kitchen. Yet every day millions of women have to open cans the dangerous, laborious old-fashioned way. Food is spilled and wasted. Fingers are cut and torn—often followed by infections and blood poisoning that result in expensive doctor bills. Opening cans the old way is a job nasty enough to make most any **man** swear—this amazing new way—it's so easy a ten-year-old **child** can do it with perfect safety! No wonder women—and men, too—simply go wild over it!

I want you to see this surprising new invention with your own eyes. I want you to know why everyone, man or woman, falls for it the instant they see it. Whether you are an experienced salesman, or never sold a penny's worth of anything in your life—I want to tell you about a remarkable new sales plan that wins you a profit on every call you make. This plan is made possible by another spectacular money maker in the Speedo line and guarantees you a steady income of up to $150 a week!

Free Trial—Act Quickly!

If you are ambitious—if a new, but tested and proved opportunity to make $75 to $150 a week interests you—act at once before some other live wire beats you to this lifetime opportunity. Without obligation, learn about these amazing lifetime patented inventions and get my FREE TRIAL OFFER. Just mail the coupon today—NOW!

SPEEDO

PATENTED HOUSEHOLD SPECIALTIES

CENTRAL STATES MFG. CO.

4500 Mary Ave., Dept. K-701, St. Louis, Mo.

Works Like a Charm!

Full Time

$265 In a Week
"Here is my record for first 30 days with Speedo:—June 13, 60 Speedos—June 20, 84 Speedos—June 30, 192 Speedos—July 6, 288 Speedos. Speedo sells to 9 out of 10 prospects." M. Ornoff, Va.

SPARE TIME $9 First Half Day
"The first afternoon I received my Speedo outfit I made $9." Mrs. R. Spain, Kansas.

PART TIME $20 in 3 Hours
"I worked about three hours and took 25 orders. This is certainly a money-maker." O. C. Gregg, Wyo.

No Jagged Edges To Cut Fingers

Speedo cuts the top out, smooth, slick, and clean. Ends forever the danger of infection from fingers cut on jagged tin edges.

Food Pours Right Out

No fuss or muss. All food **pours** right out of can without scraping or "spooning." Even foods frozen in the can slip out easily.

Central States Mfg. Co.,
4500 Mary Ave., Dept. K-701, St. Louis, Mo.

Yes, rush me the facts and details of your FREE OFFER.

Name.....

Address.....

City.....State.....